CENTRAL DELTA WATER AGENCY
235 East Weber Avenue • P.O. Box 1461 • Stockton, CA 95201
Phone 209/465-5883 • Fax 209/465-3956

February 7, 2006

Via Facsimile (916) 653-6077

Feb 07, 2006 00133

Paul A. Marshall
Department of Water Resources
South Delta Branch
Draft EIS/EIR Comments
1416 Ninth Street, 2nd Floor
Sacramento, CA 95814

Re: South Delta Improvements Program
Draft Environmental Impact Statement/Environmental Impact Report

Dear Ladies and Gentlemen:

Please receive the following comments:

Flood Control and Levee Stability

The DEIS concludes that the impacts are less than significant. The analysis appears to focus on gate capacity to pass a 100 year flood. The DEIS fails to provide the assumed channel flows at each barrier location and the before and after cross sections used in the analysis.

Even assuming that the flows used represent a 100 year flood, such a level of protection is inappropriate for design of what is in effect a blockage or dam in a major flood control channel or flooding.

Residential structures and a variety of public facilities are protected by the levee systems which are endangered by the proposed barriers. Of monumental importance is the RD 17 levee system which is across the San Joaquin River from the proposed Head of Old River Barrier. Even with the gates open the Head of Old River Barrier could increase flood flows down the San Joaquin River and could alter the direction and velocity of such flows so as to undermine, erode or increase seepage through or under the nearby levees. The appropriate level of protection for designing such a channel blockage would appear to be a project flood level of 1 in 500 years or at the very least a 1 in 200 year event.

The critical issue is not whether the gates can pass a 100 year flood but rather at what increase in flood water elevation and with what effects on flow patterns and velocities. Appendix G does not even reflect consideration of the potential impact to Union Island, Stark Tract or RD 17 (which protects parts of Stockton, Lathrop and Manteca). The analysis concludes:

> "The results indicate that the gates will result in less than 0.5-foot increase in average upstream level during a dry year and less than a 1-foot effect during a wet year."
>
> "The maximum variation for the wet year 1983 is forecast for the Grant Line Canal for the LOD 2020 condition at 0.50 foot."
>
> "These results indicate a negligible impact on levee stability as a result of the increase in upstream water level."

The Final Recommendations Report of the California Floodplain Management Task Force dated December 2002 recommends that protection should exceed the 100 year flood level and that design should focus on the "Reasonable Foreseeable Flood". The report provides further in a proposed Executive Order:

> "In the siting, design, and construction of State structures in floodplains, state agencies generally should strive to exceed NFIP design standards in accordance with a complete flood risk analysis of a site and preserve natural floodplain functions and benefits to the extent feasible."

The NFIP limitation of .1 foot increase in the flood level elevation would appear to be exceeded at all barrier locations and the desired higher level of protection is obviously not provided.

The DEIS relies on a November 1992 stability failure analysis prepared by the U.S. Army Corps of Engineers and appears to totally ignore the 2003 CESPK LEVEE TASK FORCE "Recommendations for Seepage Design Criteria, Evaluation and Design Practices" Report Prepared For The Sacramento District U.S. Army Corps of Engineers dated July 15, 2003, which was signed by the Chief, Division of Engineering, California Department of Water Resources. Of particular focus is underseepage both at the flood stage and at intermediate sustained water levels.

The barriers or gates can and should at the least be designed to be flood neutral. This can be accomplished by setting back the levees at the gate or barrier locations a sufficient distance such that there is no increase in flood levels at a "Reasonably Foreseeable Flood" level. The

DEIS does not reflect a competent or good faith effort to examine and/or mitigate the flood-related impacts.

Scour and Sedimentation

The DEIS reflects that gate operation itself even without increases in export pumping will at times cause more of the exported water to flow through Middle River and parts of Old River to the export pumps. Increased export pumping will also increase such flows. There are two well known locations where significant scour has occurred which would appear to be the result of flow to the export pumps. One is at the northeast corner of Woodward Island where scour removed the cover over the top of the buried EBMUD pipelines. The other is at the southeast corner of Woodward Island where the Middle River flow from the north turns west into Woodward Canal and North Victoria Canal and thence into Old River to proceed south to the export pumps. The Woodward Island levee at this later site appears to be suffering from undercutting and increasing underseepage. This problem was called to your attention in previous comments to the Draft EIR/EIS - Interim South Delta Program submitted January 31, 1997, with corrections February 3, 1997, a copy of which is attached hereto. DEIS Chapter 5.6 Sediment Transport concludes there are no significant sedimentation or scouring impacts as a result of implementation of any of the alternatives. Although it is clear that gate operations and increased exports each add to the reverse flows in Middle River and that adverse impacts have been brought to the attention of DWR, there is no analysis or explanation to support the conclusion except as to the effects in the immediate vicinity of the gates/barriers.

It is crystal clear that water depths in the channels surrounding Coney island have become more shallow. While the locals believe that reduced water levels due to pumping is the cause, DWR and other supporters of the export projects contend that the real problem is regional sedimentation unrelated to export pumping. The DEIS fails to analyze or attempt to explain the regional sedimentation in a meaningful way. One would expect natural sedimentation to move downstream with flood flows. With export pumping and barrier/gate operations, reversed direction of net flow is increased and therefore the increased trapping of sediments in the region would be a logical result.

Water Levels

Aside from the impacts of increased water levels affecting levee stability as discussed above, there is the recognized but understated lowering of water levels so as to adversely impact navigation, irrigation and other public trust values.

DEIS Figure 4-1 shows reduced water levels upstream of the Grantline Canal Barrier for all alternatives for a period beginning in April and extending through September. Figure 2-3 shows minor spot dredging and some conveyance dredging in limited portions of the affected

area. The water level and the resulting volume of water upstream of the gates must be sufficient to 1) provide adequate dilution of salts and a variety of contaminates, 2) assure adequate depths for navigation and environmental purposes and provide an adequate water supply for irrigation. It is not clear from the discussion or analysis that the project is committed to achieve such objectives or what impacts will result.

The DEIS reflects adverse water levels downstream of the barriers but understates the extent of the impact. Figure 2-3 shows minor spot dredging in the southwesterly portion of Victoria Canal, North Canal and conveyance dredging in West Canal but no dredging in Old River around Coney Island, other portions of Victoria Canal and North Canal or areas of Middle River north of Hwy. 4. Navigation both recreational and commercial and irrigation diversions in these areas are already adversely affected by export project operations and the proposed gate operation and increased exports will clearly increase the adverse impacts.

Reduced water levels will reduce the rate of flow through existing irrigation diversion facilities. In the case of pumps, there will be an increase energy consumption and loss of efficiency. The reduced rate of flow is likely to increase the time needed to accomplish irrigations and result in increased costs and in some cases reduced crop yields.

In the case of siphon operation, there is in addition to the concern for so-called "Tidal Levels" a real problem with loss of prime or suction due to wave action. The wave action from vessels could be affected by changes in channel configuration as well as changes in "Tidal Levels". The DEIS does not appear to address such concern.

Navigation

In addition to the water level and sedimentation issues discussed above, it would appear that there is no "boat lock" proposed for the Middle River barrier. (DEIS 7.4-22) With growing populations, the need for recreational opportunity will increase. A major landowner on Drexler Tract has expressed concern that future recreational opportunity will be greatly diminished due to the lack of a boat lock in the Middle River barrier. The area of concern is located in close proximity to Hwy 4 and extends easterly to Tracy Blvd.

The under utilization of portions of the south Delta for recreation is due in substantial part to the unmitigated impacts of export project operations. The DEIS lacks a comparison to pre-SWP and CVP conditions which would greatly assist decision makers and the public in evaluating alternatives and appropriate mitigation.

Passage of commercial vessels for emergency and routine levee work should be included in gate and barrier design.

Water Quality

The DEIS concludes there are no significant impacts on water quality as a result of implementation of the project alternatives. (DEIS 5.3-2) This conclusion is based on an unsupported determination that unless there is a violation of a water quality objective, or a 5% long term increase in baseline average salinity or an increase on a monthly basis of more than 10% of an applicable objective, the impact is not significant.

Water Quality Objectives are set only for specific locations and do not provide generalized protection of water quality for agriculture. Of particular concern to the Central Delta Water Agency are areas along the Stockton Ship Channel, the portions of Old River and Middle River south of the San Joaquin River and the various connecting channels. There are no water quality objectives protecting such areas. Even in the areas protected by a water quality objective there are existing salinity problems which will clearly be aggravated by any increase in salinity.

The DEIS ignores the clear nondegradation policy of the State as well as the nondegradation policy in the Federal Clean Water Act.

Additionally, it is universally recognized that increased salinity in water at the levels relevant herein are detrimental. As explained in Department of Water Resources, the California Water Plan Update Bulletin 160-93 at pages 131 and 132 (CDWA-14)

> "Salty irrigation water presents several costly problems for farmers. In many agricultural areas, it is common to recirculate irrigation water a number of times to increase irrigation efficiency. Salty water can be recycled fewer times than water that is initially low in salt. Also, more salty water must be used for irrigation than is required when using supplies low in salt. The requirement to use more water results in significant additional cost for pumping and handling the water and, perhaps, additional cost to purchase the water.
>
> Generally, the most salt-tolerant crops are not the ones having highest value. Therefore, given a salty water supply, a farmer may be required to grow less valuable crops than is possible when low-salt irrigation water is available.
>
> Finally, crop yields fall as salt in the irrigation water increases beyond the optimal ranges specific to individual crops."

In addition to the question of whether or not there will be a substantial loss in crop yield, there are obvious impacts associated with the increased water diversion and the drainage pumping of the additional water for leaching. Changes in farming practices, application of soil amendments and drainage improvements cost money and could result in detrimental

environmental impacts.

The testimony of Rudy Mussi (CDWA-9a, b & c) and Kurt Sharp (CDWA-8), farmers in the area of concern, confirms the salt damage to their crops and the fact that increased salt means increased crop damage.

The restraining characteristics of the soils in much of the Delta must be recognized in analyzing the impacts of increased salinity. The drainage characteristics of the soil including the permeability of the soil, the depth of the water table and the constraints of required farm practices are critical.

In addition to the loss of crop yield, it is clear that increased diversion of water for leaching, installation and operation of additional drainage improvements and the addition of more water and soil amendments will result from salinity increases.

The significance of increased salinity is well documented. DWR Bulletin 160-93 The California Water Plan Update at pages 130-132 outlines the many impacts resulting from reduced water quality. As to the impact on urban consumers, the bulletin provides:

> "Many studies have cited the impacts of water quality on the value of water to urban consumers, and all have cited the difficulty of expressing quality impacts in a simple way. A 1989 review of consumer impacts of the mineral content of Delta water proposed a generalized cost of $0.68 per acre-foot per milligram per liter of incremental total dissolved solids. The current generalized value would be about $0.80 per acre-foot per milligram per liter (adjusted using the Consumer Price Index), or about $0.30 per pound of dissolved mineral matter in the water. The impact of this added cost can be quite significant."

Failure to Protect the Public Interest and Public Trust

Although the Department of Water Resources has many duties, some of which have the potential for conflict, its duties to protect the public interest and comply with the Watershed Protection Act, Delta Protection Act and San Joaquin River Act cannot be accorded a junior priority to its duties as operator of the State Water Project.

The Water Code provides:

"§ 102. State ownership of water; right to use

> All water within the State is the property of the people of the State, but the right to the use of water may be acquired by appropriation in the manner provided

by law.

"§ 105. Development for public benefit

It is hereby declared that the protection of the public interest in the development of the water resources of the State is of vital concern to the people of the State and that the State shall determine in what way the water of the State, both surface and underground, should be developed for the greatest public benefit.

§ 107. Declarations of state policy

The declaration of the policy of the State in this chapter is not exclusive, and all other or further declarations of policy in this code shall be given their full force and effect.

In the case of National Audubon Society v. Superior Court, 33 Cal.3d 419, the California Supreme Court at page 446 found:

"c. The state has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible."

DWR is, of course, a Department of the State. It cannot set aside its public trust or public interest responsibilities and even for a time play a role as mere permit holder and exporter. The DEIS as prepared by DWR fails to set forth any alternatives directed specifically at protecting the public interest and public trust with a priority over exporting water.

Apart from the more general public trust and public interest responsibilities there are a number of statutes which specifically apply to this matter.

Water Code section 12232 which provides:

"§ 12232. Duty of state agencies not to cause degradation of quality of water

The State Water Resources Control Board, the State Department of Water Resources, the California Water Commission, and any other agency of the state having jurisdiction, shall do nothing, in connection with their responsibilities, to cause further significant degradation of the quality of water in that portion of the San Joaquin River between the points specified in Section 12230." (Emphasis added.)

Water Code section 12230 provides:

"§ 12230. Legislative findings and declaration

The Legislature hereby finds and declares that a serious problem of water quality exists in the San Joaquin River between the junction of the San Joaquin River and the Merced River and the junction of the San Joaquin River with Middle River; that by virtue of the nature and causes of the problem and its effect upon water supplies in the Sacramento-San Joaquin Delta, it is a matter of statewide interest and is the responsibility of the State to determine an equitable and feasible solution to this problem."

Brandt Bridge is of course clearly within the area of concern.

Water Code section 12201 provides:

"§ 12201. Necessity of maintenance of water supply

The Legislature finds that the maintenance of an adequate water supply in the Delta sufficient to maintain and expand agriculture, industry, urban, and recreational development in the Delta area as set forth in Section 12220, Chapter 2, of this part, and to provide a common source of fresh water for export to areas of water deficiency is necessary to the peace, health, safety and welfare of the people of the State, except that delivery of such water shall be subject to the provisions of Section 10505 and Sections 11460 to 11463, inclusive, of this code."

"§ 12202. Salinity control and adequate water supply; substitute water supply; deliver

Among the functions to be provided by the State Water Resources Development System, in coordination with the activities of the United States in providing salinity control for the Delta through operation of the Federal Central Valley Project, shall be the provision of salinity control and an adequate water supply for the users of water in the Sacramento-San Joaquin Delta. If it is determined to be in the public interest to provide a substitute water supply to the users in said Delta in lieu of that which would be provided as a result of salinity control no added financial burden shall be placed upon said Delta water users solely by virtue of such substitution. Delivery of said substitute water supply shall be subject to the provisions of Section 10505 and Sections 11460 to 11463, inclusive, of this code."

"§ 12204. Exportation of water from delta

In determining the availability of water for export from the Sacramento-San Joaquin Delta no water shall be exported which is necessary to meet the requirements of Sections 12202 and 12203 of this chapter." (Emphasis added.)

Water Code section 11460 provides:

"§ 11460. Prior right to watershed water

In the construction and operation by the department of any project under the provisions of this part a watershed or area wherein water originates, or an area immediately adjacent thereto which can conveniently be supplied with water therefrom, shall not be deprived by the department directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein."

Environmental Water Account

The DEIS fails to set forth any alternative to the Environmental Water Account such that the SWP and CVP export pumps would be required to shut down to fully mitigate their respective impacts. The Environmental Water Account has not been defined nor subjected to environmental review for operations beyond 2007. The DEIS has failed to incorporate environmental review of an EWA program beyond 2007.

Aquatic Vegetation

Reverse flows and shallow water levels are currently trapping large quantities of water hyacinth in the vicinity of Coney Island. On the Old River side the hyacinth accumulate on the Coney Island Bridge supports and coupled with reverse flow of water toward Clifton Court Forebay and the federal pumps exert a damaging force on the bridge. The hyacinth also block portions of the entire water surface such that navigation, fish and wildlife and recreational resources are adversely impacted. The DEIS fails to address such impacts.

Failure to Consider Alternatives for Protection of Fish

Appendix B contains a series of charts showing SWP and CVP Fish Salvage Density Patterns together with export pumping rates. See Figures B-3,4,5,6,,17,20,23,26,29,31 and 32. The DEIS should include alternatives which would eliminate the Head of Old River Barrier and entirely preclude export pumping during periods of significant "fish density". This could be

done on an adaptive management basis tied to actual take or sampling of fish populations. The alternatives could range from zero export pumping during the period April 15 to May 15 pulse flow period to zero pumping during a period extending from January through the middle of June. The alternatives should include consideration of projects south of the Delta which could make up for reductions in water supply due to reduced export pumping. Such projects among others could include increased conservation, water reclamation, brackish and sea water desalting, groundwater banking of local and imported water, interconnections among regional water suppliers which would allow for the sharing of surplus water and expansion of grey water systems.

Given the state of decline of the Pelagic fisheries in the Bay/Delta estuary, there is no justification for any increase in exports during periods of significant "fish density".

Lack of Appropriate Base Case

The DEIS includes a "No Action Alternative" with average annual total exports of 5,902,000 acre feet including average annual transfers of 250,000 acre feet.

A Base Case alternative which includes D-1485 as modified by the 1992 CVPIA requirements, the 1993 winter-run Chinook Salmon Biological Opinion and the March 6, 1995 Biological Opinion for the Effects of Long Term Operations of the CVP and SWP for Delta Smelt would provide decision makers and the public with a more meaningful comparison. It is important to recognize that D-1485 was primarily directed at protection of striped bass and did not address the broader range of fish species now of concern.

D-1485 candidly provided at page 13:

> "While the standards in this decision approach without project levels of protection for striped bass, there are many other species, such as white catfish, shad and salmon, which would not be protected to this level. To provide full mitigation of project impacts on all fishery species now would require the virtual shutting down of the project export pumps. . ."

The DEIS fails to provide any alternative which approaches a virtual shutting down of the project export pumps and therefore fails to provide any alternative which will fully protect the "public trust".

Attached hereto are "Additional Comments on SDIP DEIS" and the following:

1) January 31, 1997 Corrected 2-3-97 Re: Draft EIR/EIS - Interim South Delta Program

2) Testimony of Kurt Sharp

3) Testimony of Rudy Mussi

4) Page 3-10 from Draft Program - Environmental Impact Report for the Consolidated and Conformed Place of Use

5) Sources and Circulation of Salt in the San Joaquin River Basin by Leslie F. Grober

Respectfully submitted,

DANTE JOHN NOMELLINI
Manager and Co-Counsel

DJN:ju
Enclosures

Additional Comments on SDIP DEIS

1. **Scope of Impact Analysis.**

One of the three (3) purported "needs for the proposed action" is the following:

> *"Increase exports to south-of-Delta contractors.* There are unmet water supply needs, with respect to quantity and reliability, south of the Delta for agriculture, municipal and industrial, and environmental uses." (Draft EIS/EIR, hereinafter "DEIS," Appendix A, p. A-2, emphasis in original.)

Before the Projects or any other responsible agency can authorize a project to meet those needs, both CEQA and NEPA require that they first, i.e., prior to such authorization, thoroughly investigate, discuss, and analyze the potential environmental impacts that "may" directly or indirectly result from such authorization. If after the result of such an investigation, discussion and analysis it turns out that there are potentially substantial adverse environmental impacts, then those impacts must be avoided or mitigated to the extent feasible.

For example, as CEQA Guidelines section 15064, subdivision (d), explains:

> "In evaluating the significance of the environmental effect of a project, the Lead Agency shall consider direct physical changes in the environment which may be caused by the project and reasonably foreseeable indirect physical changes in the environment which may be caused by the project." (Emphasis added.)

To conduct such a mandatory consideration for the instant project which seeks to satisfy unmet south-of-the-Delta water needs with increased exports, the lead agencies must identify where those increased exports are going to come from and where they are going to be delivered after they are exported. The lead agencies must also identify when such exports and deliveries are going to occur. The fundamental CEQA and NEPA tasks are to investigate, discuss and analyze how all aspects of the environment (both in-Delta and out-of-Delta) may be directly or indirectly affected by exporting water to meet those needs which, in the absence of the proposed project, would not be exported to meet those needs. Thus far, such a good faith, threshold investigation, discussion and analysis is lacking.

For example, while the DEIS states that the increased exports may come from "water transfers" from "areas upstream of the Delta on tributaries of the Sacramento and San Joaquin [Rivers]," the DEIS fails to evaluate the potential environmental impacts which may result in either those particular areas where the transfers take place or the areas receiving those transfers. (DEIS, p. 2-15.) As the DEIS explains:

> "Potential effects of transfers in areas upstream of the Delta on tributaries of the Sacramento and San Joaquin, and within areas received the transfers, are not

addressed because of the speculative nature of the amount, timing, source, and use of transfers that occur in any particular water year." (DEIS, p. 2-15.)

As noted above, CEQA Guidelines section 15064, subdivision (d), requires lead agencies to address "direct physical changes in the environment which may be caused by the project" and "reasonably foreseeable indirect physical changes in the environment which may be caused by the project." (Guidelines, § 15064, subd. (d), emphasis added.) Thus, a lead agency cannot refuse to analyze the impacts from water transfers since it cannot say for certain what the details of those transfers will be, rather, in such a situation it must analyze impacts that "may" result from reasonably foreseeable transfers.

To the extent no transfers are reasonably foreseeable, the under CEQA and NEPA it is premature and unlawful for the lead agency to authorize any transfers at this time. As the California Supreme Court made clear nearly two decades ago, while environmental review of "future action" related to a project, i.e., in this case the export of water made available from water transfers, may be deferred in appropriate circumstances:

> "[I]f the future action is not considered at [the outset], it will have to be discussed in a subsequent EIR before the future action can be approved under CEQA." (Id. at p. 396, emphasis added.)

Thus, neither the Projects nor the US Army Corps, nor another other agency, can lawfully authorize any such transfers without first properly examining their potential environmental impacts. To the extent the Projects fail to so examine those impacts in the instant environmental review process, then the Project's authorization of increased exports must expressly exclude the authorization of any such transfers.

The same is true for whatever the source of water may be which the Projects intend to export pursuant to this project, i.e., sources other than "water transfers," e.g., reservoir re-operation, etc. The full range of potential direct and indirect impacts to the entirety of the affected environment, i.e., from the source of the water to the ultimate place of delivery, must be examined prior to the Projects', or any other agencies', authorization to export such water. Thus far, the DEIS fails to both adequately identify the sources of water to be exported by the project as well as examine said full range of impacts resulting from the export of such water.

a. **Reservoir Releases.**

To the extent the source of water to be exported by the project comes from reservoir releases, then the DEIS must at a minimum do the following, which it thus far has not done: (1) sufficiently set forth and describe the affected reservoirs' historic and current "release programs;" (2) provide an adequate analysis of how those release programs may be modified by the implementation of the SDIP; and (3) provide an adequate investigation, discussion and analysis of how the environment, including downstream water quantity and quality and aquatic resources

may be adversely impacted by any such modifications. (See County of Amador v. El Dorado County Water Agency (1999) 76 Cal.App.4th 931.)

b. **Drainage Impacts from Use of Exported Water.**

With regard to the evaluation of impacts in the areas where exported water will ultimately be delivered, one of the critical direct and/or indirect impacts which the DEIS must properly evaluate is the potential for such exported waters to be delivered to areas which directly drain surface and subsurface waters, and, hence, the various pollutants contained in such waters, into the San Joaquin River or delivered to upslope areas which generate hydraulic pressure which thereby increases the drainage of waters from the downslope lands into the San Joaquin River. The potential for such impacts is widely recognized and well-established. (See e.g., "Discharges of agricultural drainage, containing salts, selenium, boron, molybdenum, and other trace elements, have degraded the water quality of the San Joaquin River" [SWRCB's "Draft Program Environmental Impact Report for the Consolidated and Conformed Place of Use," p. 3-10, attached hereto].)[1]

The proposed project clearly intends to facilitate exports of water to such areas, however, the DEIS fails to properly investigate, discuss, analyze, and ultimately mitigate to the extent feasible, the potential impacts from those exports on the water quality in the San Joaquin River.

The DEIS states:

> "The potential indirect effects of the SDIP providing increased CVP deliveries that would add to the salt load at Vernalis were considered in the CALSIM salinity estimates at Vernalis that were used in DSM2. However, most of the additional CVP deliveries would be made to the CVP San Luis Unit contractors (e.g., Westlands Water District). Most of the CVP deliveries to water districts along the San Joaquin River are DMC exchange contractors who already

---

[1] See also, SWRCB's Decision 1641 at page 83 wherein the SWRCB states with regard to salinity: "[T]he SWRCB finds that the actions of the CVP are the principal cause of the salinity concentrations exceeding the objectives at Vernalis. The salinity problem at Vernalis is the result of saline discharges to the river, principally from irrigated agriculture, combined with low flows in the river due to upstream water development. The source of much of the saline discharge to the San Joaquin River is from lands on the west side of the San Joaquin Valley which are irrigated with water provided from the Delta by the CVP, primarily through the Delta-Mendota Canal and the San Luis Unit. The capacity of the lower San Joaquin River to assimilate the agricultural drainage has been significantly reduced through the diversion of high quality flows from the upper San Joaquin River by the CVP at Friant. The USBR, through its activities associated with operating the CVP in the San Joaquin River Basin, is responsible for significant deterioration of water quality in the southern Delta." (See http://www.waterrights.ca.gov/ hearings/decisions/WRD1641.pdf at "pdf" p. 95.)

> receive their full allocation of Delta water in almost all water years. Changes in the Vernalis EC estimates caused by the SDIP were negligible." (DEIS, p. 5.3-14.)

That paragraph does not fulfill the lead agencies CEQA or NEPA obligations with respect to addressing the exported water's potential adverse impacts on the water quality in the San Joaquin River.

For starters, the lead agency's CEQA and NEPA duty is by no means limited to addressing "salinity" impacts from drainage of exported water into the San Joaquin River. For example, as CEQA Guidelines section 15382 explains, the lead agency's duty is to investigate and evaluate the project's potential to result in "significant effect[s] on the environment" which are defined as:

> "[A] substantial, or potentially substantial, adverse change in <u>any</u> of the physical conditions within the area affected by the project including land, air, <u>water</u>, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." (Emphasis added.)

It is well-recognized that drainage from exports to areas which directly or indirectly drain into the San Joaquin River can and do contain numerous other contaminants which the lead agency has a CEQA duty to properly investigate and evaluate. (As noted above, see e.g., "Discharges of agricultural drainage, containing salts, selenium, boron, molybdenum, and other trace elements, have degraded the water quality of the San Joaquin River" [SWRCB's "Draft Program Environmental Impact Report for the Consolidated and Conformed Place of Use," p. 3-10, attached hereto].)

The lead agencies' duty is likewise not limited to avoiding or lessening impacts to agricultural water users which the Vernalis Salinity Standard is intended to protect. For example, under CEQA, the duty is to "assess[] the impact of a proposed project on the environment" which is far-reaching duty that extends well beyond impacts to agricultural water users. (See e.g., CEQA Guidelines, §§ 15126.2, subd. (a), 15064, 15065 & 15382.)

Pursuant to the same Guidelines sections referenced above, the lead agencies' duty is by no means limited to evaluating impacts at Vernalis. Instead, the lead agencies are required to evaluate "substantial, or potentially substantial, adverse change[s] in any of the physical conditions within the area affected by the project . . . ." (CEQA Guidelines, § 15382.) The area affected by drainage from exports to the CVP service areas, for example, extends considerably beyond Vernalis. The area affected is roughly a "sixty mile reach of the lower SJR [San Joaquin River] from Lander Avenue to Vernalis . . . ." (See "Sources and Circulation of Salt in the San Joaquin River Basin, p. 2, attached hereto.)

///

i. **Assuming Arguendo the Lead Agencies' Obligation is to Only Consider Impacts on the Vernalis Salinity Standard The Lead Agencies Nevertheless Fail to Fulfill that Obligation.**

Assuming arguendo that the lead agencies CEQA and NEPA responsibilities to consider the drainage impacts from exports on the water quality in the San Joaquin River is limited solely to consider impacts on salinity and on agricultural users downstream of Vernalis (which is clearly is not so limited), the lead agencies' consideration of such impacts is still inadequate.

First, the lead agencies' DEIS "must demonstrate that the significant environmental impacts of the proposed project were adequately investigated and discussed . . . ." (Guidelines, § 15125, subd. (c), emphasis added.) As CEQA Guidelines section 15003, subdivision (d), similarly provides:

> "The EIR is to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action."

Thus far, it cannot be fairly said that the DEIS has made those demonstrations. To the contrary, the DEIS demonstrates that the project's potential adverse drainage impacts on the water quality in the San Joaquin River were not meaningfully addressed or evaluated.

Such a demonstration is lacking since there is a threshold failure to provide sufficient "facts and analysis [and] detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the [project's potential drainage impacts on the water quality in the San Joaquin River]." (*Association of Irritated Residents, supra*, 107 Cal.App.4th 1383 at 1390.) As the court explains in *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831, in order "to allow the EIR to fulfill its informational purpose":

> *"The EIR must contain facts and analysis*, not just the bare conclusions of a public agency. An agency's opinion concerning matters within its expertise is of obvious value but the public and decision-makers, for whom the EIR is prepared, should also have before them the basis for that opinion so as to enable them to make an independent, reasoned judgment." (Emphasis added.)

And as the court further explains in *Al Larson Boat Shop, Inc. v. Board of Harbor Commissioners* (1993) 18 Cal.App.4th 729, 740, "The EIR must effectively disclose to the public the 'analytic route the . . . agency traveled from evidence to action.' [Citations.]"

The DEIS comes no where close to containing the requisite "facts and analysis" or disclosure of the "analytic route" necessary to enable the public and the decision makers to make "an independent, reasoned judgment," of either (1) the amount of drainage water the project may introduce into to the San Joaquin River, in the form of surface or subsurface return flows; or (2) the extent such introduction of drainage water may result in potentially substantial impacts on the

water quality in the San Joaquin River via the introduction of salt, boron, selenium and other contaminants. Instead, the above-referenced paragraph in the DEIS mentioning the potential for such drainage impacts merely provides the bare conclusions (i.e., "Changes in the Vernalis EC estimates caused by the SDIP were negligible" [DEIS, p. 5.3-14]) without any meaningful explanation of how the lead agencies arrived at those conclusions.

In order to enable the public and the decision makers to make "an independent, reasoned judgment" of the validity of that conclusion, the public and the decision makers would, at a minimum, need a good faith disclosure of what factors and assumptions the EIR preparers took into consideration in arriving at that conclusion. For example, precisely where did the EIR preparers assume the water would be delivered? When did they assume the water would be delivered and how did they assume they water would be used? Did the EIR preparers take into consideration both surface and subsurface return flows? Did the EIR preparers take into consideration the hydraulic pressure influence on return flows? Similarly, there is no disclosure of information concerning when, where and how such return flows were measured. Were the measurements taken along all significant stretches of the San Joaquin River or just a few select locations?

Assuming answers to such questions could be found somewhere in the administrative record, it is inappropriate to require the public and the decision makers "to painstakingly ferret out" such answers. (Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892, 911.) "An adequate EIR requires more than raw data; it requires also an analysis that will provide decision makers [and the public] with sufficient information to make intelligent decisions. (See, e.g., Guidelines, § 15151.)" (County of Amador v. El Dorado County Water Agency (1999) 76 Cal.App.4th 931, 955.) The potential for adverse drainage impacts on the water quality in the San Joaquin River from Delta exports is far too well-recognized to not merit a thorough, up-front and good faith disclosure and discussion in the text of the actual DEIS.

Finally, since the CALSIM model wherein "[t]he potential indirect effects of the SDIP providing increased CVP deliveries that would add to the salt load at Vernalis were [presumably in some fashion] [']considered[']" (DEIS, p. 5.3-14) assumes that releases will be made from New Melones to offset any increased salt loads at Vernalis from SDIP in order to meet and maintain the Vernalis Salinity Standard, the lead agencies have a CEQA and NEPA duty to examine the full range of potential environmental impacts from requiring New Melones to make those releases. For example, such an examination would evaluate where such releases would have gone in the absence of the SDIP and evaluate how all aspects of the environment may be directly or indirectly affected by redirecting those releases to offset the increased salt loads at Vernalis caused by the SDIP.

Moreover, since USBR contractors, such as Stockton East Water District, have a Water Code section 11460 prior right to New Melones water that cannot be directly or indirectly deprived by the Project's operations, the DEIS must fully address the potential for SDIP to so result in such direct or indirect deprivation and describe potentially feasible mitigation measures

to ensure that such an unlawful deprivation does not occur. The SDIP project purports to not impede on water rights, yet the DEIS fails to provide the basic environmental analysis to demonstrate that SDIP will not so impede on the water supplies of senior and paramount water right holders. An impact on water supplies that deprives a senior or paramount water right holder of its legally entitled water supply is not your run of the mill "significant impact" for CEQA and NEPA purposes. Instead, since such impacts are contrary to law, such impacts must be entirely avoided rather than merely "mitigated to the extent feasible." A potential mitigation measure to entirely avoid such impacts would be to require the Projects to offset any such increased salt loads at Vernalis from SDIP with dilution water from a source other than New Melones.

Whatever actions are taken by the Projects or otherwise to offset SDIP's impacts on the water quality in the San Joaquin river at Vernalis (or upstream of Vernalis), the entire purpose of CEQA and NEPA is to compel the lead agencies to address the potential environmental impacts from those actions on all aspects of the environment. Thus far, the DEIS fails to demonstrate that such impacts have been properly investigated, discussed, analyzed, mitigated or avoided.

ii. **Conducting and Disclosing the Omitted Investigation and Analysis of Drainage Impacts on the Water Quality in the San Joaquin River Would Have Been Reasonably Feasible.**

> "When assessing the legal sufficiency of an EIR, the reviewing court focuses on adequacy, completeness and a good faith effort at full disclosure. [Citation.] . . . . Analysis of environmental effects need not be exhaustive, but will be judged in light of what was reasonably feasible. *(Association of Irritated Residents , supra,* 107 Cal.App.4th 1383, 1390.)

A meaningful investigation, disclosure and analysis of SDIP's potential drainage impacts on the water quality in the San Joaquin River would clearly be "reasonably feasible." There is in fact a well-known computer model, the "SJRIO Model," which is specifically designed to evaluate such impacts. The description of the model at pages 2 and 3 of "Sources and Circulation of Salt in the San Joaquin River Basin, attached hereto, shows that it is particularly apt for the task of exploring and evaluating JPOD's potential drainage impacts on the water quality in the San Joaquin River.

While there may be other methods or models to meaningfully address SDIP's potential drainage impacts on the water quality in the San Joaquin River, the existence of this model demonstrates that the evaluation and disclosure of SDIP's potential drainage impacts on the San Joaquin is most certainly "reasonably feasible."

///

///

2. **Thresholds of Significance.**

The DEIS states at page 3-6:

> "The threshold of significance, or significance criteria, for each resource category varies depending on the resource and standards, if any, set by regulating agencies. These criteria are used to evaluate the significance of an impact."

The DEIS should be revised to clarify, and its assessment of the significance of impacts should be amended to take into consideration, "the fact that a particular environmental effect meets a particular threshold cannot be used as an automatic determinant that the effect is or is not significant." (Protect The Historic Amador Waterways v. Amador Water Agency (2004) 116 Cal.App.4th 1099, 1109.)

The DEIS should further be revised to acknowledge, and its assessment of the significance of impacts should be amended to take into consideration, that one of the paramount and overriding standards for water quality is the SWRCB's "Anti-Degradation Policy," i.e., the SWRCB 1968 Resolution No. 68-16 entitled, "Statement of Policy with Respect to Maintaining High Quality of Waters in California." Said Anti-Degradation Policy provides in pertinent part:

> "Whenever the existing quality of water is better than the quality established in [water quality control] policies [such as the standards set forth in various SWRCB and Regional Water Quality Control Board Water Quality Control Plans] as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

The Federal EPA requires all states to adopt an "antidegradation policy" similar to the SWRCB's Resolution 68-16. (See 40 C.F.R. 131.12.) Resolution 68-16 is further intended to, and does, implement Water Code section 13000 which requires the SWRCB to regulate all "activities and factors which may affect the quality of the waters of the state" such that they "attain the highest water quality which is reasonable."

Accordingly, as far as thresholds of significance are concerned, the SWRCB's Resolution 68-16 and Water Code section 13000 provide thresholds that go well beyond those set forth in the SWRCB and RWQCB's Water Quality Control Plan, or in any other national, statewide or regional plan or policy. Thus far, the DEIS fails to properly recognize and take into consideration SWRCB's Resolution 68-16 and Water Code section 13000.

///

3. **Alternative Analysis.**

The alternative section of the DEIS is deemed the "core" and "heart" of the DEIS under CEQA and NEPA, respectively. The DEIS must present a "reasonable range" of alternatives to the proposed project which as CEQA explains will "permit a reasoned choice [among alternatives to the project]" and "foster informed decision making and public participation." (Guidelines, § 15126.6, subds. (f) & (a), respectively.)

Since the instant project is composed of two (2) separate components (i.e., the physical/structural component and the operational component) with each component being separately and independently adopted at a different point in time, both CEQA and NEPA require that the DEIS provide a reasonable range of alternatives to each component. Thus far, the DEIS has failed to do so.

a. **Physical/Structural Component.**

The current range of alternatives to the physical/structural component lacks the requisite variety necessary to fully the purposes of the DEIS's alternative analysis. Since the this component is independent of the operational component and an alternative for this component will be selected regardless of what alternative, if any, is ultimately selected for the operational component, at a minimum each of the physical/structural component alternatives should be evaluated under the assumption that no operational component is selected. As it stands, each of the physical/structural components assume an operational component which includes exports at 8,500 cfs. Since the operational component will not be selected until a later date, if ever, and since the nature of the operational component that is ultimately selected, if any, is unknown and could very well be, as a result of further fishery studies, etc., dramatically different than what the currently contemplated operational components consist of, as it stands the DEIS fails to provide a meaningful range of alternatives for the physical/structural component and improperly analyzes such alternatives assuming an operational component which includes exports at 8,500 cfs.

The DEIS also wrongfully rejects a reduced export alternative for detailed analysis in the DEIS's range of reasonable alternatives. When it came to screening alternatives for inclusion in said range, there were only two (2) objectives that are applicable to the physical/structural component: (1) minimize the loss of San Joaquin River salmon as a result of operation of the Project's export facilities; and (2) improve the reliability of the SDWA to divert water needed to meet consumptive use needs within its boundaries by maintaining adequate water quality and quantity. (See DEIS, Appendix A, p. A-2).

It is well-settled under CEQA, for example, that to be eligible for inclusion in the EIR's range of reasonable alternatives the alternative need not meet "all" of the project's basic objective, only "most" of those objectives. (See e.g., Guidelines, § 15126.6, subd. (a).) The DEIS explains that a reduced export alternative would fully meet the first objective and would

partially meet the second objective. (See DEIS, Appendix A, p. A-7&8 and A-13, respectively.) Thus, a reduced export alternative would meet "most" of the project's basic objectives and should not have been rejected on the grounds that it did not fully meet the second objective.

Furthermore, the DEIS fails to provide the requisite facts and analysis to support its conclusion that "[b]ecause reduction of CVP and SWP exports can worsen water quality in the south Delta and does not improve the ability of south Delta farmers to divert, [a reduced export alternative] does not meet the local objective . . . ." (DEIS, Appendix A, p. A-13.) The facts and analysis supporting that conclusion are not disclosed. Moreover, it is clear that a permanent gate, for example, "can" worsen water quality and not improve the ability of some south Delta farmers to divert if that gate is not accompanied by other measures to offset or mitigate those impacts, e.g., dredging and agricultural pumps, etc. Thus, dredging, for example, could be incorporated along with a reduced export alternative just as dredging is incorporated along with the other physical/structural alternatives. Thus far there appears to be no good faith attempt to design a reduced export alternative "package" as was done with the other alternatives which would collectively fully satisfy "most" of the basic objectives of the physical/structural component. Such a reduced export alternative should therefore have been fully presented and included in the DEIS range of alternatives and compared and contrasted with the other alternatives. The lead agencies' rejection of a such an alternative for inclusion in that range is contrary to law and not supported by substantial evidence.

b. **Operational Component.**

According to the DEIS there was only one project objective for the operation component used to develop a range of reasonable alternatives to that component. That objective was the following:

> "Increase water supply to SWP and CVP water contractors through increased diversions into CCF and maximize the frequency of 8,500 cfs pumping at SWP Banks facility." (DEIS, Appendix A, p. A-13.)

Under CEQA and NEPA a lead agency cannot present an unduly narrow project objective which unfairly limits the range of potential alternatives. Here, the lead agencies have done precisely that. This "objective" is far too narrow to fulfill the purposes of an alternative analysis under CEQA and NEPA.

The "true" underlying "basic" objectives should be more fairly described as meeting the water needs of water users south of the Delta and modifying the rate of exports from the Delta to minimize impacts to fish and other water users. The lead agencies' "preferred method" to meet those "true" objectives is apparently to "increase diversions into CCF and maximize the frequency of 8,500 cfs pumping." (Ibid.) However, the entire purpose of the mandatory alternative analysis under CEQA and NEPA is for the lead agency to develop and discuss in

detail alternatives to their preferred method to meet the project's basic objectives. As discussed above, the range of alternatives to the preferred method must contain sufficient variety to "permit a reasoned choice [among alternatives to the project]" and "foster informed decision making and public participation." (Guidelines, § 15126.6, subds. (f) & (a), respectively.) Thus far, the range of alternatives to the operation components falls far short from providing the requisite variety.

As with the range of alternatives for the physical/structural component, the range of alternatives for the operational component should also include an alternative that calls for a reduction, or at least no increase, in total annual exports from the Delta and, instead, attempts to meet the water needs of water users south of the Delta by providing them alternative non-export water supplies or otherwise helping them to reduced their demand for export water supplies. A reduced export alternative could help meet the other underlying basic objective, i.e., help minimize the impacts from exports on fish and other water users, (1) by either reducing total annual exports from the Delta or by not increasing such amounts and/or (2) by altering the timing of exports to avoid such impacts without increasing total annual exports over existing levels.

Rather than undertake a good faith effort to develop such a reduced (or not increased) export alternative, the DEIS has seemingly ignored such an alternative presumably on the grounds that it would not meet the overly narrow project "objective" for the operational component. If that is indeed the basis for ignoring that alternative, that basis is contrary to law since that "objective" is too narrow for CEQA and NEPA purposes. Such a reduced export can meet the underlying objectives of the operational component and, thus, should be developed and included in the DEIS' range of alternatives and compared and contrasted with the other alternatives in order to provide some semblance of variety in the DEIS' range of alternatives for the operational component.

It should be further noted that such a reduced (or not increased) export alternative can still be fairly said to meet "most" of even the unduly narrow stated objectives for the operational component. That objective is at least a two part objective, i.e., (1) increase water supply to SWP and CVP water contractors through increased diversions into CCF, and (2) maximize the frequency of 8,500 cfs pumping at SWP Banks facility. (DEIS, Appendix A, p. A-13.) As noted above, alternatives need only meet "most" of the project's basic objectives, not "all" of them. An alternative that does not increase total annual exports can still be designed to "maximize the frequency of 8,500 cfs pumping at SWP Banks facility." Simply because such an alternative may not maximize such pump as much as an alternative that seeks to also maximize total annual exports, does not mean that such an alternative does not meet that project objective. To the contrary, such an alternative still strives to maximize such pumping. Whether any particular alternative meets the objectives better than another objective is not the test for inclusion in the DEIS' range of alternatives. Which alternative is the "best" and should be adopted is a determination which the decision makers must ultimately make upon review of the alternatives in the DEIS.

An alternative that does not increase total annual exports can also fully meet the objective to "increase water supply to SWP and CVP water contractors through increased diversions into CCF . . . ." Such increases can be offset by decreases to CVP water contractors through the CVP's Tracy pumping plant, e.g., to benefit fish and wildlife or water levels or quality in the south Delta, such that the total amount of annual exports from the Delta is reduced or not increased over existing levels.

Thus, it is clear that a reduced (or not increased) export alternative can fully meet "all" (and certainly "most") of the unduly narrow stated objectives for the operational component. Accordingly, such an alternative is eligible for inclusion in the DEIS's range of alternatives to the operational component and the failure to so include such an alternative is contrary to law and the evidence.

January 31, 1997
CORRECTED 2-3-97

Via Facsimile No. (916) 653-9574
and Regular U.S. Mail

State Lead Agency
Department of Water Resources
Stephen Roberts, Project Manager
1416 Ninth Street
Sacramento, California 95814

Federal Lead Agency
Bureau of Reclamation
Alan R. Candish
7794 Folsom Dam Road
Folsom, California 95630

Re: Draft EIR/EIS - Interim South Delta Program

Dear Sir:

The Central Delta Water Agency is concerned with the combination of projects and characteristics of the projects. The head of Old River barrier and three flow control structures are projects required to mitigate adverse impacts of the SWP and CVP exports from the Delta. The new intake structure at the SWP Clifton Court Forebay and the other features appear to be designed to increase exports from the Delta, thereby adding to adverse impacts when it has not yet been demonstrated that even the existing adverse impacts will be mitigated. Consideration of increased exports should be deferred until such time that the adverse consequences of existing levels of exports are fully mitigated.

Water Quality

The Draft EIR/EIS concludes that the proposed ISDP-related changes in salinity did not indicate violations of Delta Water Quality standards therefore, the adverse impacts are considered to be less than significant. Delta Water Quality standards do not adequately protect agricultural water uses in the Delta and

therefore are not an appropriate measure of significant impact. It should also be noted that whether or not the Delta Water Quality standards adequately protect other uses including those related to fish and wildlife remains to be demonstrated.

The present Delta Water Quality standards for agriculture in the interior and western Delta extend only from April 1st through August 15th and apply only to a limited number of locations. Typically, the irrigation of many crops extends through September and "winter flooding" extends through October, November, December and portions of January. Depending upon the rainfall, pre-irrigation is necessary in February and March.

Typically with the exception of September and October of the driest years, historical water qualities for the unprotected months have been far better than the standards.

The year around water qualities necessary to sustain agriculture in the Central Delta Area have been determined by the Central Delta Water Agency to be as set forth in Exhibit "A" attached hereto.

The Draft EIR/EIS at page 4-45 shows increased chlorides by more than ten percent (10%) at Prisoner's Point and San Andreas Landing for many of the most important irrigation months in most years. The specific concentrations are not given and therefore the impact of the increase cannot be adequately determined.

There is no water quality data presented for areas likely to be most adversely impacted such as:

1) San Joaquin River between the head of Old River and the confluence with Middle River
2) Turner Cut
3) Empire Cut
4) Middle River between Highway 4 and the San Joaquin River and
5) Victoria Canal

To the extent that the water quality at Clifton Court and the Los Vaqueros Reservoir Supplemental Intake are representative, the impact appears to be significantly adverse.

Improper Combination of Projects

The Draft EIR/EIS fails to provide sufficient information or analysis to separate the adverse impacts resulting from the independent project elements.

Decision makers are not being provided sufficient information to determine whether or not they should construct just the three flow barriers or the three flow barriers plus the head of Old River barrier or just the new intake or any other alternative.

We support the objective of mitigating the adverse impacts caused by the projects but object to the shifting of such impacts onto other Delta users. The SWP and CVP are by law required to limit exports to water surplus to the needs of the Delta and other watershed of origin users. The degradation of water quality in the Central Delta appears to be caused by the introduction of more poor quality San Joaquin River water. In order to prevent such degradation, the Draft EIR/EIS should address measures to correct the degradation such as reducing water deliveries into those areas along the west side of the San Joaquin Valley which drain into the San Joaquin River, controlling releases of drainage to times when adequate dilution is available, providing dilution water from San Luis Reservoir and/or by recirculating water by way of the Delta Mendota Canal or California Aqueduct and providing a drain to the ocean. Although the impacts are not segregated, the proposed increase in exports would appear likely to increase the adverse impacts. The Draft EIR/EIS should analyze the steps necessary to dilute or otherwise correct the degradation of the San Joaquin River water quality so that no degradation in Central Delta water quality would result from the installation of the three flow barriers and head of Old River barriers or increased pumping.

The burden to be placed on the exporters for correction of the results of the San Joaquin River degradation should most heavily fall upon the CVP in that the USBR contrary to the laws of Congress contracted its San Luis Unit Water without the assurance of construction of a drain. Attached hereto as Exhibit "B" please find a copy of the relevant portions of the San Luis Act.

Piecemeal Analysis

Inclusion of the increased export segment requires that north Delta facilities and changes to operation of the Delta Cross Channel be analyzed. To do otherwise is a clear attempt to

artificially piecemeal a project which should be analyzed as a whole.

Impacts of Increased Exports

The increased export segment requires that compliance with the November 12, 1986, letter agreement between the Department of Water Resources and Department of Fish and Game be explained in the EIR/EIS.

The most pertinent portion of said agreement provides as follows:

> "The two departments agree that further measures will be needed to offset all adverse fishery impacts of the State Water Project in the delta and have agreed to begin discussing how to offset impacts not covered by this agreement. Until agreement is reached on such issues, the State Water Project will not be operated to export more water than can be exported by the existing pumps, except during winter months when additional amounts can be diverted during high San Joaquin River flow periods.
>
> Finally, in an effort to provide for greater public confidence that the agreement will be diligently implemented, both departments have agreed not to object to the participation of groups concerned with protecting fish resources in efforts to enforce the agreement."

Has agreement been reached as to how to offset all adverse fishery impacts? The answer is obviously "NO"!

The efficacy of such measures as the 1995 Water Quality Control Plan fish requirements and the head of Old River barrier remains to be demonstrated.

The existing adverse impacts of the SWP and CVP not only on fish but on water quality and water levels should be fully mitigated before embarking upon further exports.

A reasonable alternative which has not been evaluated would be the three flow barriers with the head of Old River Barrier and with measures to correct the degradation of the San Joaquin River upstream of Vernalis including recirculation and such limited reductions in deliveries to the exporters as may be necessary. Additional features would only be included to the extent they are

necessary to reduce other adverse impacts of the SWP and CVP on the Delta.

Need to Utilize Full Pumping Capacity and Banks Pumping Plant

The EIR/EIS at page 1-5 cites the SWP water supply contracts as justification for the need to utilize the additional pumps. It is interesting to note when the additional pumps were installed the representation was made that the additional pumps were simply needed for maintenance of existing levels of pumping such as operation when other pumps were down for maintenance.

Water Code sections 12200, et seq. limits the export of water to that which is surplus to the needs of the Delta and other "areas of origin". The EIR/EIS correctly points out that SWP contract entitlements have increased while the ability to develop additional water supplies is diminishing. Without the development of additional water supplies, the additional export pumping will simply further deplete the so-called unregulated flow. This increased reliance on unregulated flow is contrary to the plan of the SWP and CVP which was to continue to develop new conservation storage projects as the needs developed, thereby protecting the interests of both the "areas of origin" and the export areas. Attached hereto as Exhibit "C" are excerpts from the December 1980 Preliminary Edition of Bulletin 76 which clearly show that surplus unregulated flow and the supply from Oroville and San Luis would only meet the needs until about 1981. Thereafter, other development such as " Middle Fork of Eel, Trinity River No. 1, Trinity River No. 2, Mad-Van Duzen and Klamath River No. 1 would be required.

The EIR/EIS does not contain any evidence to show that increased export of unregulated flow will not cause further significant damage to fish and wildlife and water quality. The portion of the San Joaquin River between the Old River fish barrier and Middle River is of particular concern.

Fishery Impacts

Since the SWP commenced its operations, major fish populations in Sacramento/San Joaquin Delta have diminished and two have been declared to be endangered (Delta Smelt and Winter Run Salmon).

Although much more study is required to determine what is needed to protect and restore fish populations, it is absolutely clear that increased export pumping will cause further damage to

the fish. Mitigation measures implemented to this date have not been demonstrated to be effective and the EIR/EIS should forthrightly critically analyze the effectiveness of the proposed mitigation.

The disingenuousness of the State and Federal actions including the EIR/EIS analysis is punctuated by the statement at page 1-7 as follows:

> "To deal with take of delta smelt and winter-run chinook salmon under the regulatory authority of the Endangered Species Act (ESA), the State-federal agreement empowered a joint State-federal operations group (CALFED Operations Group) to develop operational flexibility by adjusting proposed export limits. Adjustments would be based on real-time monitoring data and are intended to result in no net annual water supply loss to CVP and SWP water users." (emphasis added)

The commitment to no water supply loss to CVP and SWP water uses is unsupported and contrary to law which limits exports to surplus flows. The December 15 State-Federal Accord also contrary to law includes the requirement that the burden of San Joaquin River flows will be imposed on the "watersheds of origin" and not on exports. The stipulation "that the new standards effectively offset the existing indirect losses of fish attributable to joint CVP/SWP operations," is not supported by any scientifically reliable data or analysis. It is apparent that a politically expedient compromise was made which remains to be supported with competent evidence as to the real impacts on fish and other resources. Such a political compromise does not eliminate the need for analysis in this EIR/EIS.

Wasteful, Inefficient and Unnecessary Consumption of Energy and Growth Inducing Impacts

Aside from the obvious illegality of agreeing to give priority to exports of water from the Delta over "area of origin" needs including those of fish and wildlife, the EIR/EIS fails to analyze the growth inducing impacts and increased use of energy resulting from the increased export of water to foster greater development of the deserts of southern California. Attached hereto as Exhibit "D" are excerpts from the June 1992 "Current and Projected Water Needs In the Metropolitan Water District of Southern California Service Area" submitted by the State Water

Contractors to the State Water Resources Control Board as SWC Ex 36. It is clear that much of the new growth is in the inland desert regions such as Riverside and San Bernardino counties. That the gallons per capita day in the desert regions are about 66% higher than in the coastal areas and about 30% higher than in the so-called inland area. Without imported water, growth in the deserts would be constrained. The growth-inducing impact of the increased exports should be analyzed.

Since a given population can be adequately served with less water in the inland or coastal areas and in areas of comparable temperatures closer to the source of water, the wasteful, inefficient and unnecessary consumption of energy associated with increased exports must be analyzed. The analysis should include the energy losses associated with the lifting and transportation of such water and those associated with the evaporative and seepage losses.

The analysis in Chapter 8 does not address such concerns.

Water Levels

We continue to be concerned with the impact upon water levels in the areas downstream from the proposed South Delta barriers. As recognized in the EIR/EIS, it is extremely difficult to predict such effects with precision. It would appear that other factors besides tides and export pumping rates are relevant. The variation in Clifton Court gate operations, barometric pressure changes, sedimentation and variation in local diversion rates could add to the complexity. Adequate mitigation of water level impacts requires that minimum water level objectives be established for the area of pumping influence, probably those areas within two miles of the intakes. There should be a clear and enforceable requirement that the export diversions from the Delta channels be curtailed during such periods of low water levels.

Reliance on Old River (Component 2)

We object to the proposed extensive reliance on Old River to carry the water to the export diversion facilities. Such reliance requires excessive dredging in areas which likely will cause increased seepage into adjoining levees and lands and aggravate existing scour conditions. Increased diversions will of course require more extensive dredging than would be required to mitigate existing problems. Under existing conditions, much of the cross-delta flow from Middle River passes through Woodward Canal

and North Victoria Canal into Old River and thence to the export diversions. The Middle River flow must wrap around the southeast corner of Woodward Island. This condition appears to have resulted in undermining of the Woodward Island levee and has contributed to increased seepage. Although called to the attention of DWR, the problem has been ignored. Component 2 as proposed will make the problem worse. Component 2 should be modified to ensure that the flow through Middle River reaches Clifton Court Forebay by way of Victoria Canal and North Canal rather than by way of Woodward Canal and North Victoria Canal. Removal of portions of the channel islands and dredging of the shoals in Middle River, Victoria Canal and North Canal would reduce the dredging in Old River. Although all dredging has the potential to increase seepage, our experience would reflect that the deeper the dredging cuts into the underlying sands, the greater the problem. The deeper dredging generally requires steeper slopes which tend to resist resealing and also have an increased propensity to slip. The assumption that confining dredging to the center two-thirds of the channel and maintenance of minimum 3 to 1 side slopes would alleviate the potential for levee instability is unsupportable. The changing dynamics of river flows and currents, the variation in channel configuration, the variation of soil types, the fluctuation in groundwater levels, the possibility of earth tremors, and the interaction with biological factors guarantees that such 3 to 1 side slopes will not remain stable. An ongoing maintenance effort will be required. History has shown that promised actions of State and Federal water agencies and others particularly with regard to difficult problems such as seepage and levee stability problems are not fulfilled. Adequate mitigation requires advance deposit of sufficient funds controlled by a reliable third party to assure that maintenance of the underwater slopes and mitigation of the seepage problems will be carried out.

Attached hereto as Exhibit "F" is draft of a Mitigation Agreement proposed by the Central Delta Water Agency in connection with the Delta Wetlands Project. This draft reflects the basic structure of what we view to be the minimum requirements for mitigation of the proposed dredging impacts.

Because the local Reclamation Districts' facilities could be adversely affected by your actions, approval by each of the affected Districts should be a prerequisite to your going forward with your proposal.

Flood Control

The recent flood events highlight the need to assure that the various barriers will be designed to provide for the passage of floodwaters without any increase in the flood elevation. The design should also address the need for flood control improvements. Some State and Federal officials have mentioned constructing "bypasses" for the San Joaquin River. The current bypass in the Mossdale area is Paradise Cut. Enlargement of Paradise Cut would require that both Old River and Grantline Canal carry greater flood flows.

It would appear that construction and operation of the barriers may increase sedimentation in portions of the channels. Dredging to maintain channel capacity should be a part of the plan of operation.

The barriers should also allow for the passage of barges and waterborne equipment.

Public Access

The incorporation of public recreational features should not create new public access to remotely located areas. Local law enforcement is stretched to the limit and remote locations are impossible to police. Garbage and sanitary services must also be provided. Unpoliced public access always leads to vandalism and damage to levees and other property.

Improved public access and recreational features should be located in those areas adjacent to existing public roads and facilities where policing, garbage and sanitation facilities can be effectively provided.

Respectfully submitted,

DANTE JOHN NOMELLINI
Manager and Co-Counsel

DJN:ju
Enclosures

TESTIMONY OF RUDY MUSSI

STATE WATER RESOURCES CONTROL BOARD

HEARING ON DELTA SALINITY DRAFT CDOs AND WQRP

I am a farmer and a general partner of Rudy M. Mussi Investment L.P. which holds a 50% interest in the property on Roberts Island shown in CDWA-9b. I have been farming in the Roberts Island area of the Delta for about 30 years. My ownership interest in the subject property was acquired in 1984 and I have been farming the property since about a year after acquisition.

The property is currently served with water from Middle River through the Woods Irrigation Co. canals. Said canals replaced natural sloughs connecting to Middle River. At the time of patent from the State of California the property was part of a large parcel which abutted Middle River and the San Joaquin River as well as the sloughs. Farming of the property extends back to the late 1800s and appears to have commenced at about the time when the Certificate of Purchase was issued in 1869.

The property is currently planted to grapes. Irrigation of the grapes is generally in late June, August and October depending on measurements of soil moisture. All water applied in excess of the consumptive use of the crop is drained into the Woods Irrigation Co. drainage canals and pumped back into the Delta. The actual amount of water used by the crops is reflected by the consumptive use estimates of the Department of Water Resources. The water table is relatively high and crops draw from the water table as well as the applied water.

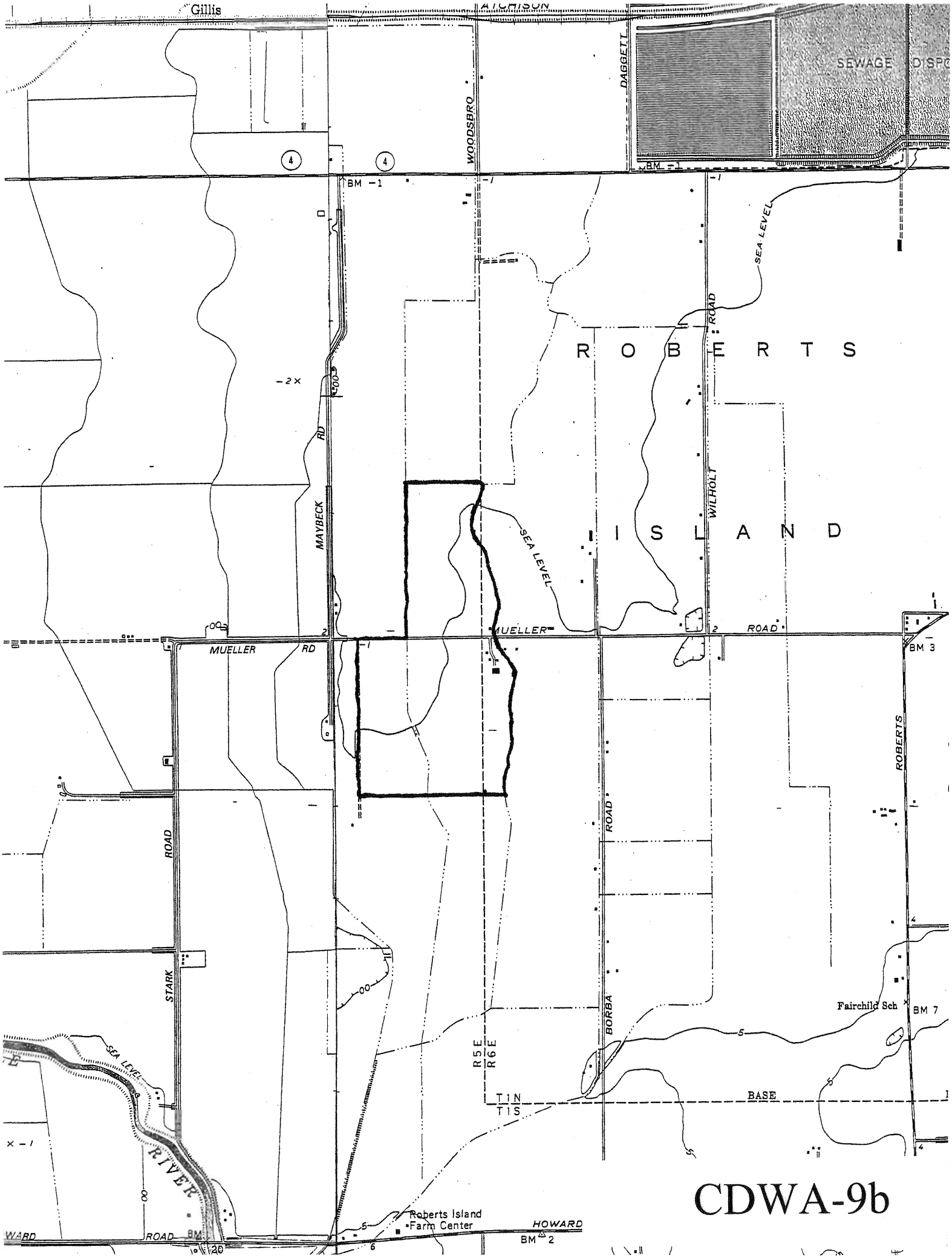
Management of the salt balance in the soil is an ongoing challenge. Attached hereto as CDWA-9c are colored maps showing areas of particular salinity concern. The darkest areas are

CDWA-9a

areas where crop damage and yield losses are already occurring. The applied water and the water table contain salts in addition to the salts remaining in the soil. When the crop uses water the salts remain in the soil profile. I depend upon October irrigation waters, rainfall and chemical treatment to leach sufficient salts from the soil profile to maintain a salt balance throughout the growing season which will avoid crop damage. My June and August irrigations are basically to meet the evapotranspiration requirements of the grapes. The field maps attached as Exhibit B show that high sodium concentrations already exist in portions of the fields and limit both production and quality. Any increased salt in the irrigation water will aggravate the existing problems and create new problems. The problem salt areas are visually apparent. The wood on the plants on these areas is smaller and more costly to prune, the vegetative cover is lighter which causes sunburn and requires culling and the harvest is noticeably lighter. Additionally, the lack of plant vigor requires special treatment to avoid plant death.

The present chemical management includes application of N. Phuric to the applied water and application of gypsum and lime to the soils. If the salinity of the irrigation water increases the amount of chemical management will also increase. I estimate the present level of chemical treatment to manage salts is costing about $100.00 per acre per year. Increases in salinity will increase the chemical costs in a greater proportion than the increase in salinity and may result in the total inability to maintain satisfactory salt balance. The result will be increased cost of the other practices described above as well as additional loss of quality and production.

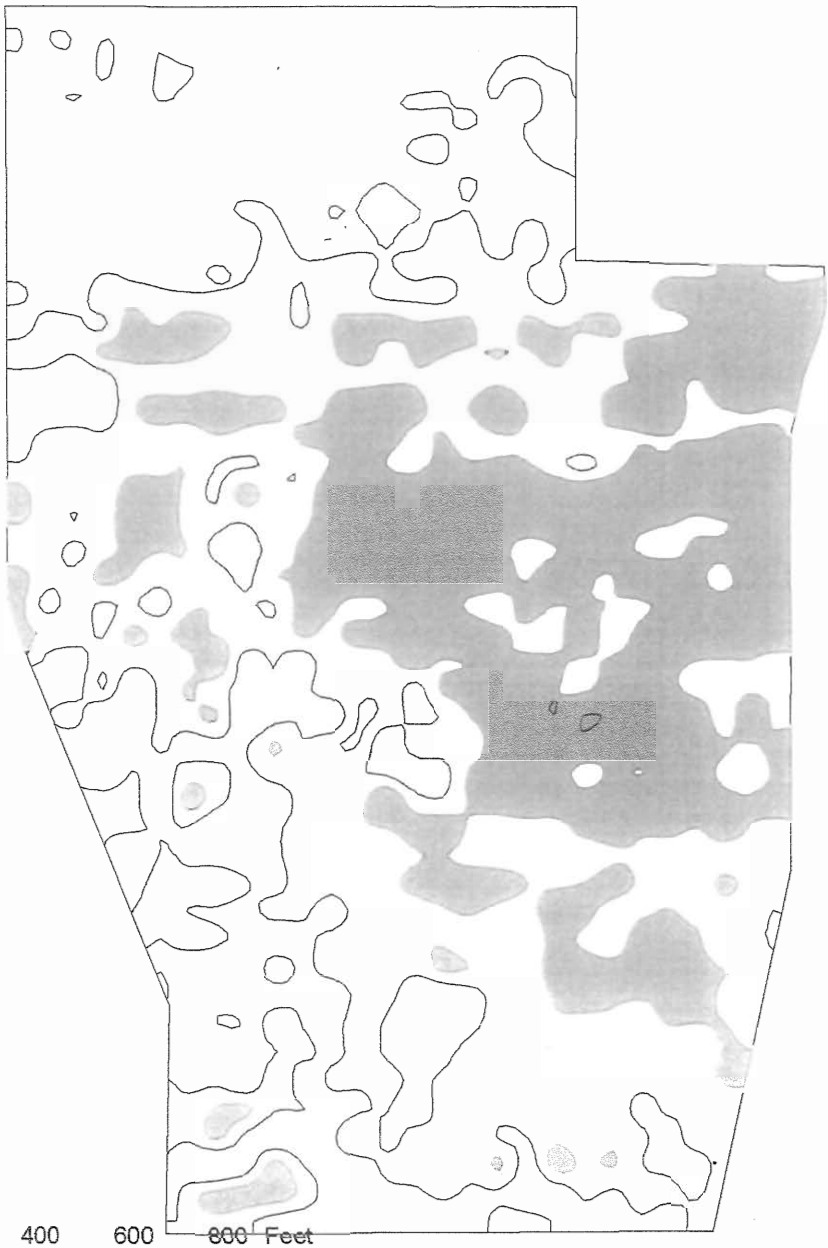
The salinity of the water in Middle River and in my irrigation increases if the salinity of the water of the San Joaquin River at Vernalis increases.


Gillis
ATCHISON
DAGGETT
SEWAGE DISPO
WOODSBRO
BM -1
SEA LEVEL
ROAD
ROBERTS
ISLAND
WILHOLT
MAYBECK
RD
MUELLER
ROAD
BM 3
ROBERTS
ROAD
STARK
ROAD
BORBA
Fairchild Sch
BM 7
R5E
R6E
T1N
T1S
BASE
SEA LEVEL
RIVER
WARD
ROAD
BM
Roberts Island
Farm Center
HOWARD
BM 2

CDWA-9b

CDWA-9c

Client; Mussi, L&R Field; 12; 01 (86.1 ac.)



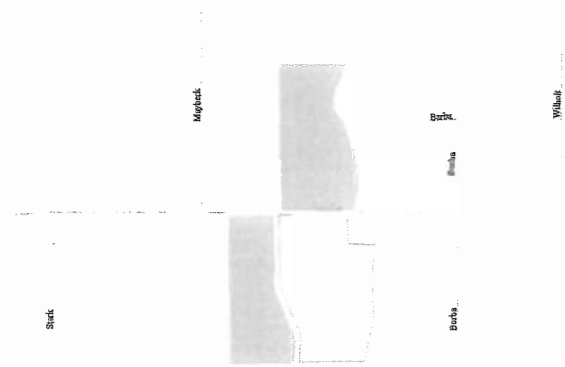
200 0 200 400 600 800 Feet

Deep Surface Polygons
- 9.8 - 40.4 (26.8 ac.)
- 40.4 - 58.6 (35.1 ac.)
- 58.6 - 91.1 (24.3 ac.)

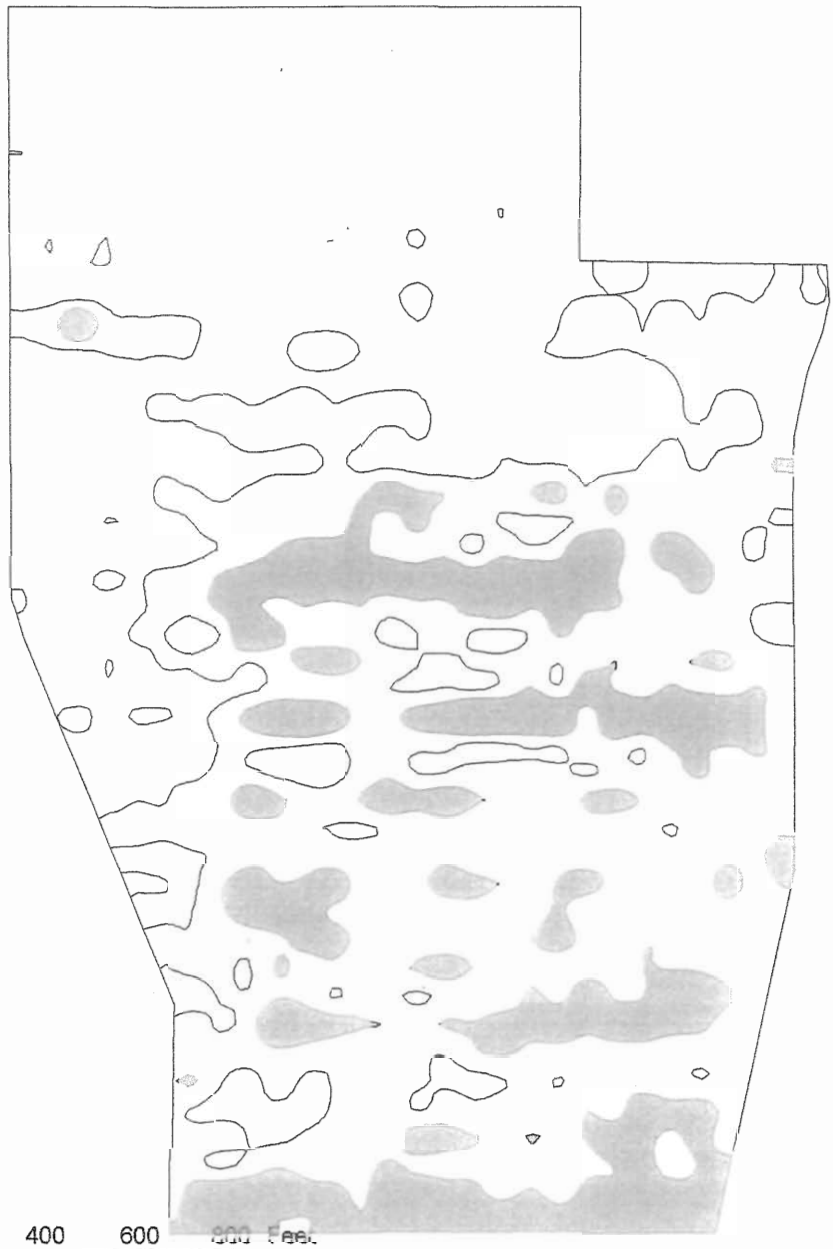
HELENA

Date: Mar 14, 2002
Field Name: 12; 01
Location: San Co., California, United States
Section 0, T, R
Section 0, T1N, R6E
Farm Name: Muller
Client Name: L&R Mussi
Total Acres: 86.1
Field Boundary Start Location:
Latitude: 37.90506132
Longitude: -121.37128516

Muller; 01



Client; Mussi, L&R Field; 12; 01 (86.1 ac.)



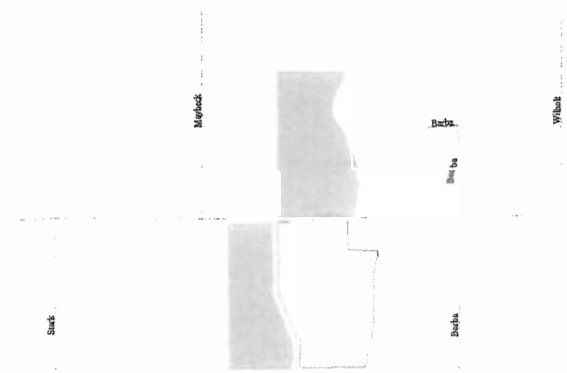
200 0 200 400 600 800 Feet

Shallow Surface Polygons
- 2.9 - 6.6 (35.5 ac.)
- 6.6 - 10.3 (36.8 ac.)
- 10.3 - 22.1 (13.8 ac.)

HELENA

Date: Mar 14, 2002
Field Name: 12; 01
Location: San Co., California, United States
Section 0, T, R
Section 0, T1N, R6E
Farm Name: Muller
Client Name: L&R Mussi
Total Acres: 86.1
Field Boundary Start Location:
Latitude: 37.90506132
Longitude: -121.37128516

Muller; 01



Client; Mussi, L&R Field; 11/13; 01 (55.1 ac.)

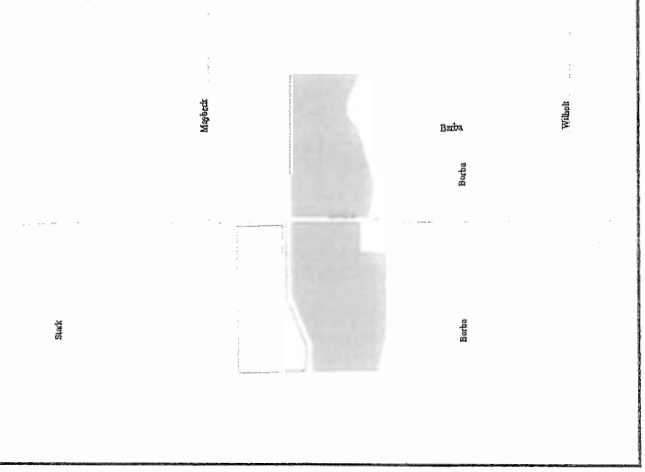
200 0 200 400 600 800 Feet

Deep Surface Polygons
- 9.7 - 28.6 (15.8 ac.)
- 28.6 - 43 (24.2 ac.)
- 43 - 67.4 (15.1 ac.)

HELENA

Date: Mar 14, 2002
Field Name: 11/13; 01
Location: San Co., California, United States
Section 0, T, R
Farm Name: Muller
Client Name: L&R Mussi
Total Acres: 55.1
Field Boundary Start Location:
Latitude: 37.90494098
Longitude: -121.37445350

Muller; 01



Client; Mussi, L&R Field; 11/13; 01 (55.1 ac.)

200 0 200 400 600 800 Feet

Shallow Surface Polygons
- 10.5 - 16.6 (22.6 ac.)
- 16.6 - 21.4 (23.6 ac.)
- 21.4 - 34.1 (9.0 ac.)

HELENA

Date: Mar 14, 2002
Field Name: 11/13; 01
Location: San Co., California, United States
Section 0, T, R
Farm Name: Muller
Client Name: L&R Mussi
Total Acres: 55.1
Field Boundary Start Location:
Latitude: 37.90494098
Longitude: -121.37445350

Muller; 01

Client; Mussi, L&R Field; 9; 01 (73.3 ac.)

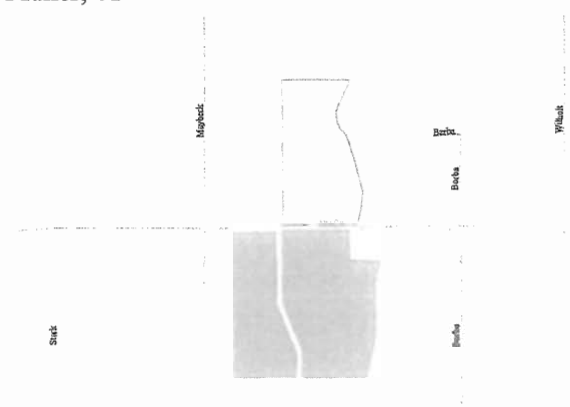
500 0 500 1000 1500 Feet

Deep Surface Polygons
- 9.4 - 35.7 (11.6 ac.)
- 35.7 - 56.9 (34.8 ac.)
- 56.9 - 105.6 (26.8 ac.)

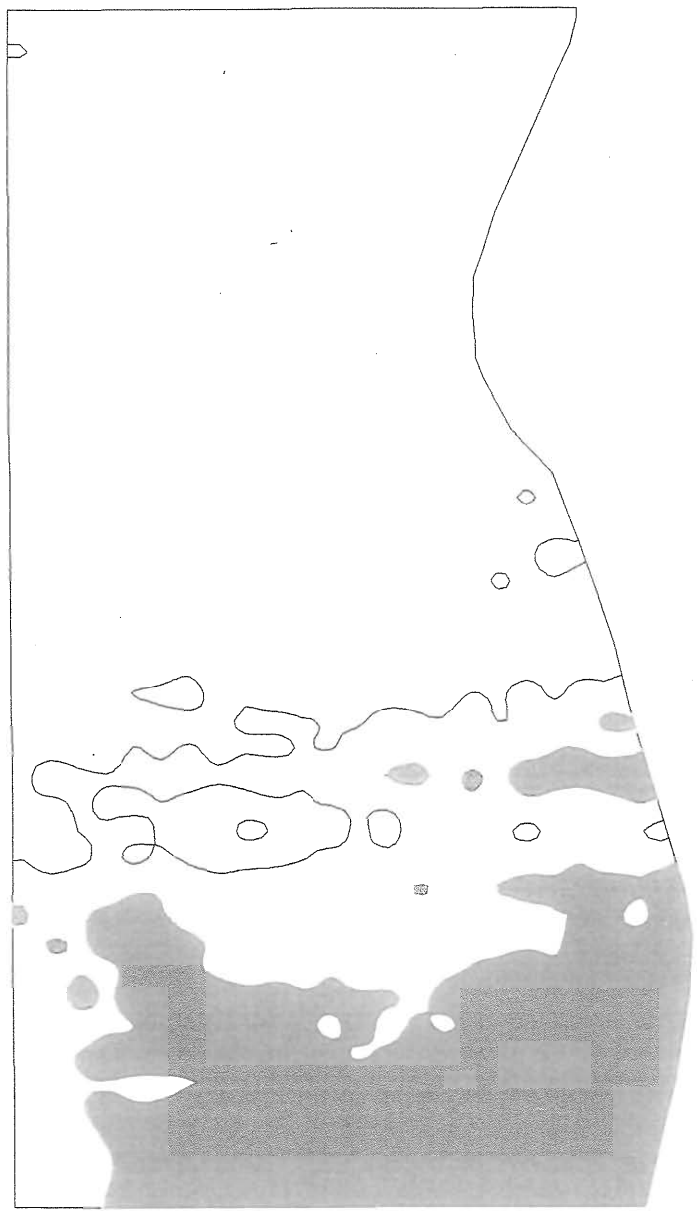
HELENA

Date: Mar 14, 2002
Field Name: 9; 01
Location: San Co., California, United States
Section 0, T, R
Section 0, T1N, R6E
Farm Name: Muller
Client Name: L&R Mussi
Total Acres: 73.3
Field Boundary Start Location:
Latitude: 37.91230401
Longitude: -121.37129800

Muller; 01



Client; Mussi, L&R Field; 9; 01 (73.3 ac.)

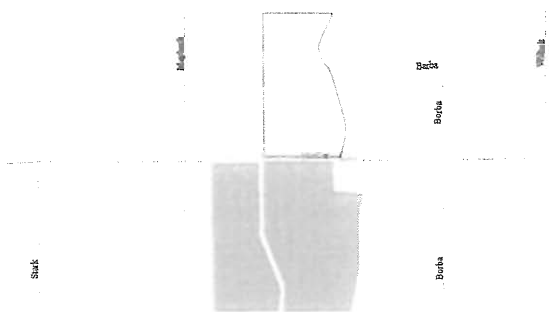


500 0 500 1000 1500 Feet

Shallow Surface Polygons
- 3.1 - 14.5 (42.0 ac.)
- 14.5 - 29 (14.9 ac.)
- 29 - 63.9 (16.3 ac.)

Date: Mar 14, 2002
Field Name: 9; 01
Location: San Co., California, United States
Section 0, T, R
Section 0, T1N, R6E
Farm Name: Muller
Client Name: L&R Mussi
Total Acres: 73.3
Field Boundary Start Location:
Latitude: 37.91230401
Longitude: -121.37129800

Muller; 01



TESTIMONY OF KURT SHARP
STATE WATER RESOURCES CONTROL BOARD
HEARING ON DELTA SALINITY DRAFT CDOs AND WQRP

I am one of the managers of R C Farms, Inc.

R C Farms, Inc. is the owner of land riparian to the San Joaquin River on Lower Roberts Island downstream of the confluence with Old River and upstream from the confluence with Turner Cut and Middle River. Said land is within the Central Delta Water Agency. Attached hereto as Exhibit A is a map showing the land. CDWA-4 is a chain of title prepared for said land. The land currently abuts the San Joaquin River and it is my understanding of the documents in the chain of title that the land has never been separated from the San Joaquin River.

As an owner of said riparian lands, R C Farms, Inc. is entitled to divert waters from the San Joaquin River for reasonable beneficial uses upon those lands. R C Farms, Inc. and its predecessors in interest have so used said waters for irrigation at various times of the year and in various quantities for a period extending back to the late 1800's.

R C Farms, Inc. was formed April 17, 1973, and shortly thereafter commenced diverting water from the San Joaquin River for irrigation of row and field crops. The amount of water used has not been measured but varies with crops and climatic conditions. Last year (2004) there were 100± acres of asparagus and 140± acres of field corn. This year (2005) there are 71± acres planted to alfalfa and 169± acres planted to field corn. Such lands of R C Farms, Inc. are below sea level and all water which is not evaporated or used for the evapotranspiration needs of the crops is pumped back into the Delta by way of the Reclamation District canals and pumping plants. Depending upon crops and climatic conditions, evaporation and/or evapotranspiration

CDWA-8

take place throughout the year. Water from the San Joaquin River constantly seeps into the land, thereby at times providing water for crops through natural sub-irrigation. Additional water is applied to crops by way of siphons. Siphons are used to supplement the irrigation of corn from near the end of June through September and to supplement the irrigation of alfalfa starting in April or May and continuing through September. "Winter" flooding of corn ground is typically in November and December. Attached hereto is Table A-5 from DWR Bulletin 168 showing estimated crops Et Values for the Delta Service Area for 1976-77. Although climatic conditions including precipitation will vary so as to change the amount of applied water required for any particular crops in any given year, Table A-5 provides a reasonable tool for estimating actual diversions and water use. Average annual precipitation in the Central Delta is in the range of 12 to 14 inches.

The points of diversion for R C Farms, Inc. are located in Sections 28 and 29, T. 2 N., R. 5 E., M.D.B. & M.

The months of special concern for R C Farms, Inc. on the San Joaquin River are April through August, the peak irrigation months, and water quality is of great concern to R C Farms, Inc. because it impacts the crops that R C Farms, Inc. grows.

Salt in the irrigation water adds to the salt in the soil and soil water. When the concentration of salts in the root zone of growing plants reaches a high enough level the plants suffer and in some cases die. Because of different soil and drainage conditions in the fields the salt problem varies. Some of the fields have areas which are already high in salts. Adding additional salt will increase the salt accumulation in the soil and damage the crops. Both the degree of impact and the area affected increase as salinity of the water entering the field

increases. There is also a problem at the time of seed germination if there is too much salt in the soil. The adverse effects of the salt on the crops is visually apparent.

Attached hereto as Exhibit B are the results of a February 7, 2003 soil sampling on the subject R C Farms, Inc. land. Sample #3 which was taken from the field in the northwest portion of the land shows a high level of sodium.

The northerly 71± acres of the property are presently planted to alfalfa and the balance of the acres are planted to field corn.

Because the surface of the land is substantially below the water level in the San Joaquin River which abuts the property the fields are constantly receiving water which "seeps" from the river. We attempt to hold the water table below the ground surface by way of drainage ditches from which the excess water flows into the Reclamation District 684 canals and then is pumped back into the Delta.

With the alfalfa we apply water from the San Joaquin River through siphons so as to flood irrigate between ridges in the fields. Typically the irrigation starts in April or May depending upon weather and continues after each cutting through September. The portions of the fields near the river receive sufficient subirrigation from seepage. The fields planted to field corn are irrigated starting near the end of June and continuing on about ten day intervals into late August or September and then the fields are flooded in November and December. The "winter" flooding of the field corn ground is a customary practice which I believe is intended to facilitate leaching of salts from the ground by the rain or at the very least drive down the salts.

The customary practices are no longer sufficient to control the salt buildup in the problem areas of the fields. Artificial leaching such as is customary for potatoes is costly and

economically infeasible for the crops which are grown.

R C Farms, Inc. has farmed said land for over twenty (20) years. The water quality at Vernalis affects the quality of the water in the San Joaquin River abutting said lands. The water from the San Joaquin River seeps into and is also applied to the lands of R C Farms, Inc. Typically higher salinity in the San Joaquin River at Vernalis are particularly at Brandt Bridge means higher salinity in the R C Farms, Inc. irrigation water.

As salinity in the seepage and applied irrigation water increases, the salinity in the soil and soil water increases thereby adversely impacting the crop production.

My family and I live in the vicinity of the R C Farms, Inc. land and boat, fish, swim and water ski in the Delta channels including the San Joaquin river along the R C Farms, Inc. land. Higher salinity water from the San Joaquin River entering the Ship Channel at Stockton, California, not only reduces the general quality of water in the San Joaquin River along the R C Farms, Inc. land but also reduces the quality in adjoining channels.

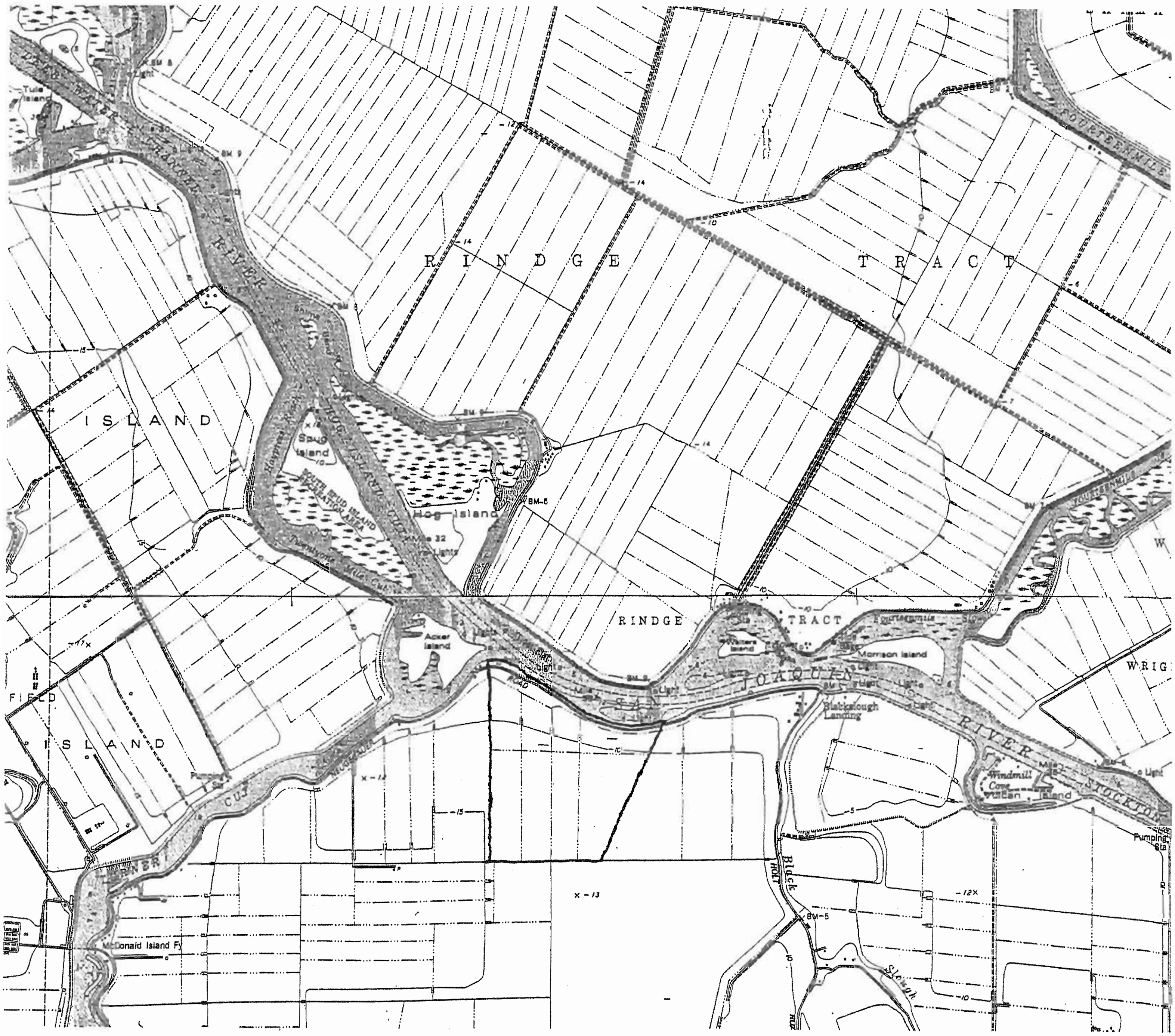

RINDGE TRACT
ISLAND
Hog Island
Acker Island
RINDGE TRACT
Morrison Island
SAN JOAQUIN RIVER
FIELD
ISLAND
Blackslough Landing
Windmill Cove
Pumping Sta
McDonald Island Fy
WRIG

EXHIBIT - A

EXHIBIT - B

Precision Agri Lab

24730 Avenue 13 Madera, CA 93637 Phone: 559-661-6386 FAX: 559-661-6135 email: pal@mail.agdecision.net

SOIL ANALYSIS REPORT

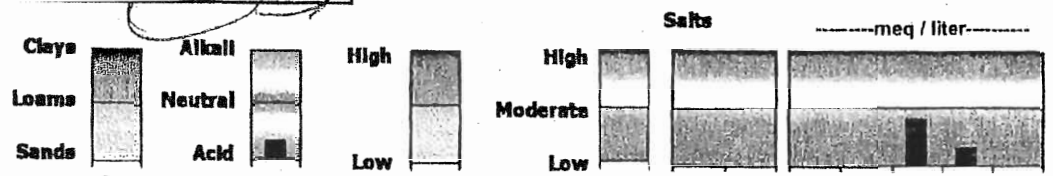
CONRAD SILVA

BRANCH NAME	WALNUT GROVE-W	**TEST ID #** 2456	**DATE SAMPLED:** 2/ 7/03
FIELDMAN	DON JOHNSON	**LOG IN #**	**DATE SUBMITTED:** 2/11/03
CROP	ASPARAGUS	**232078**	**DATE REPORTED:** 2 /17/03

See MAP

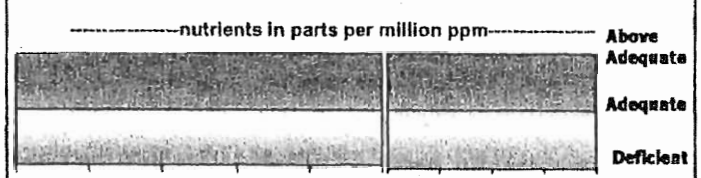
ID# 1 **DESCRIPTION** RC-1

Physical And Chemical Properties



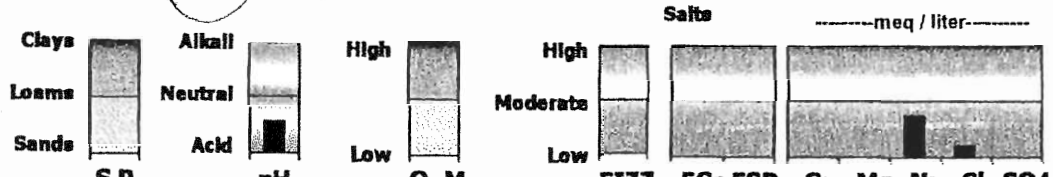
Big Field

Soil Nutrition



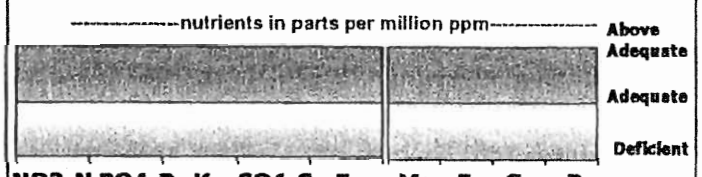
ID# 2 **DESCRIPTION** RC-2

Physical And Chemical Properties



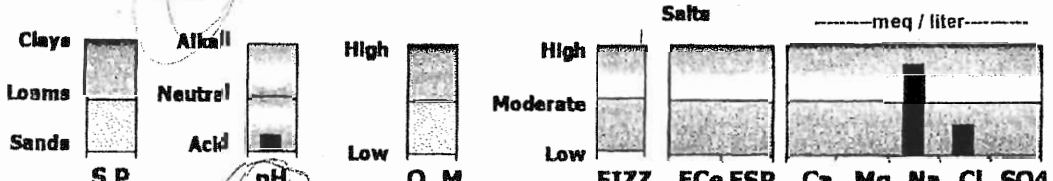
Close to Asparagus

Soil Nutrition



ID# 3 **DESCRIPTION** RC-3

Physical And Chemical Properties

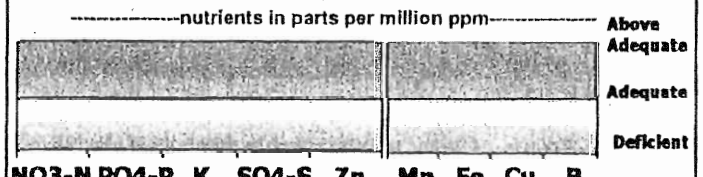


by Prune Shed

NA - 5.115

High

Soil Nutrition



APPROVED:_____

Precision Agri Lab

24730 Avenue 13 Madera, CA 93637 Phone: 559-661-6386 FAX: 559-661-6135 email: pal@mail.agdecision.net

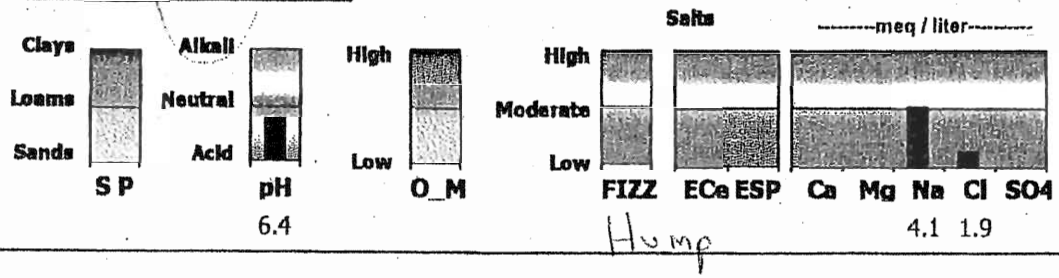
SOIL ANALYSIS REPORT

CONRAD SILVA

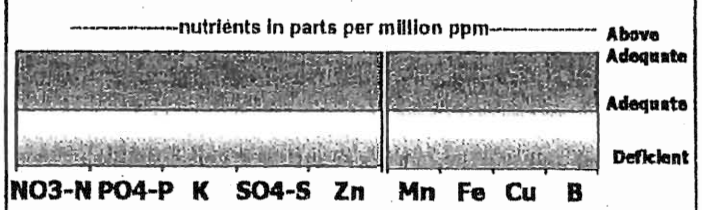
BRANCH NAME	WALNUT GROVE-W	**TEST ID #** 2456	**DATE SAMPLED:** 2/ 7/03
FIELDMAN	DON JOHNSON	**LOG IN #**	**DATE SUBMITTED:** 2/11/03
CROP	ASPARAGUS	**232078**	**DATE REPORTED:** 2 /17/03

ID#	DESCRIPTION
4	RC-4

Physical And Chemical Properties



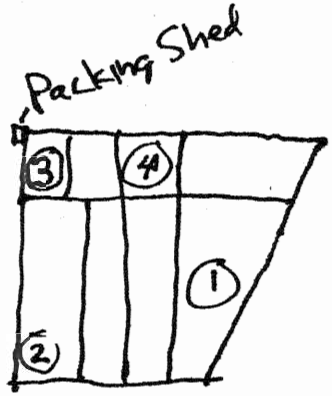
Soil Nutrition



ALL Ph Low

Salts are high

to Asp next to Packing Shed



APPROVED:_____

Draft Program

Environmental Impact Report for the Consolidated and Conformed Place of Use

Prepared for:

California State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, California 95812-2000

Petitioner:

U.S. Department of the Interior
Bureau of Reclamation

Prepared by:

CH2M HILL

December 1997

oxygenated and has low dissolved concentrations of solids throughout its length. Significant amounts of agricultural drainage are not being discharged to the river.

3.3.2.3 Sacramento-San Joaquin Delta

The Sacramento-San Joaquin Delta is a complex system of deepened and channelized rivers and sloughs of widely varying depth, flow, and water quality. The San Joaquin and Sacramento rivers meet the relatively minor flows of the Cosumnes and Mokelumne rivers and merge their waters in the Delta.

The resulting water quality of the Delta channels reflects a mixture of a large volume of higher quality water from the north (Sacramento River and American River drainages) with a relatively small volume of low-quality water from the south (San Joaquin River drainage). Salinity, including saltwater intrusion from the San Francisco Bay estuary, and agricultural drainage are the primary water quality issues of concern for the Delta. Annual seasonal saltwater intrusion is now limited to some areas of the western Delta by water management of the CVP and State Water Project (SWP) (Herbold and Moyle, 1989; Skinner, 1972). Reverse flows can occur in the fall when CVP and SWP pumping increases compared to Sacramento River inflow to the Delta, resulting in saltwater intrusion.

Specific water quality objectives have been established for M&I beneficial uses, agricultural beneficial uses, and fish and wildlife beneficial uses. Water quality objectives for the Delta are set forth in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (SWRCB, 1995) and the Bay-Delta Accord (SWRCB, 1994). These forums established objectives for dissolved oxygen, salinity, Delta outflow, river flows, export limits, toxic chemicals, bacterial contamination, and Delta Cross Channel operations.

3.3.2.4 San Joaquin River

The San Joaquin River Basin covers 15,880 square miles. It includes all watersheds tributary to the San Joaquin River and the Delta south of the Sacramento River and south of the American River watershed. This watershed excludes those lands that drain to the Tulare Lake Basin.

The principal streams in the basin are the San Joaquin River and its larger tributaries: the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno rivers. Major reservoirs and lakes include Pardee, New Hogan, Millerton, McClure, Don Pedro, and New Melones.

After leaving the Sierra Nevada, the river enters the Central Valley floor where its flows are subject to agricultural, municipal, and industrial water diversions. In addition, the river receives drainage flows from agricultural lands located in the San Joaquin Valley. As a result of these agricultural discharges and the historical alteration of surface water flows, groundwater supplies, and land use, water quality has been significantly altered. Discharges of agricultural drainage, containing salts, selenium, boron, molybdenum, and other trace elements, have degraded the water quality of the San Joaquin River.

Sources and Circulation of Salt in the San Joaquin River Basin

Leslie F. Grober[1]

Abstract

Historical data and a water quality model were used to quantify the sources of salt, boron and selenium in the lower San Joaquin River (SJR) basin, California. Mean monthly data for sources and sinks in the SJR basin and Delta Mendota Canal (DMC) service area were assembled and evaluated. The San Joaquin River Input-Output model (SJRIO), a mass balance water quality model, was used to estimate mean monthly salt, boron, and selenium loads for various inflows to the SJR. Model results show that agricultural drainage discharges are the primary source of dissolved salts, boron and selenium to the SJR. Groundwater accretions and seasonal wetland releases are also important sources of salt and boron. Salt dissolved in DMC water imports is the primary source of salt circulating in the lower SJR basin; in situ dissolution of salts and pumping from the underlying confined aquifer are important secondary sources. Salts are moved out of the basin only in the SJR but some salt is also moved out of the unconfined aquifer of the basin into long term storage in the confined aquifer beneath the basin. The DMC supplies most of the higher quality surface irrigation water in the lower SJR basin. The quality of this supply may be impaired by the recirculation of salts from the SJR to the DMC intake pump, leading to a greater net accumulation of salts in the basin.

Introduction

Water quality objectives established by the State Water Resources Control Board (SWRCB, 1995) and California Regional Water Quality Control Board, Central Valley Region (CRWQCB,CVR, 1994) for selenium, boron, and electrical conductivity (EC) are routinely exceeded in the lower SJR. Progress is now being made towards the establishment of a regulatory program (CRWQCB,CVR, 1994 and

---

[1]Associate Land and Water Use Analyst, California Regional Water Quality Control Board, Central Valley Region; 3443 Routier Road, Suite A; Sacramento, CA 95827-3098.

Karkoski, 1996) to limit the loading of selenium to the SJR. The technical challenges to establish and enforce a regulatory program for boron and total dissolved solids (TDS) will be more difficult. Naturally high concentrations of selenium are found in the soils of alluvial deposits south of Los Banos due to their provenance from rocks of marine origin in the Coastal Range (Leighton et al., 1991). The areal distribution of selenium in the lower SJR basin is therefore relatively limited compared to the widespread distribution of total salts and boron. Whereas the source of most selenium is from within the basin, large quantities of salt are imported from outside the basin via the DMC. Subsurface agricultural return flows from seleniferous soils of limited areal extent account for most of the selenium load in the SJR but the east side tributaries, groundwater and wetland releases contribute significant salt and boron loads to the SJR . The more pervasive occurrence of salt and boron make these compounds much more difficult to regulate and reduce. Water quality data for the SJR and DMC are presented here to demonstrate these differences and difficulties.

Historical and model data were assembled to show the relative contribution of selenium, boron, and TDS in the lower SJR. Flow and EC data for the DMC were also compiled to show the relative impact of this major basin import. This data was then used to make a rough accounting of salt loads in the lower SJR basin. A mass balance water quality model was used to estimate some of the salt loads in this analysis. When TDS data was not available, TDS loads were calculated based on a TDS/EC ratio of 0.6 for TDS in mg/l and EC in µs/cm.

Study Area

The area of interest is a sixty mile reach of the lower SJR from Lander Avenue to Vernalis (Figure 1). Water and salts are imported from outside the basin via the DMC of the Central Valley Project (CVP); water and salt imports are based on net quantities imported to the DMC service area on the west-side of the SJR, north of Mendota Pool. The SJR at Lander Avenue and the Merced, Tuolumne,and Stanislaus rivers are the major tributary inputs to the lower SJR.

Model Description

SJRIO is a mass balance water quality model that was originally developed to study the effects of agricultural drainage on water quality in the SJR (Kratzer et al, 1987). The model performs a mass balance accounting of mean monthly flows and loads of TDS, boron and selenium. Loads and concentrations are calculated for a sixty mile reach of river from Lander Avenue to Vernalis. Primary model components include the SJR at Lander Avenue, the upstream boundary to the model, and three east side tributaries: the Merced, Tuolumne, and Stanislaus rivers. The major sources of agricultural discharge considered in the model are Mud Slough (North) and Salt Slough, which consist of a mixture of surface and subsurface agricultural drainage, SJR flood waters and wetland releases. The model also considers minor west side tributaries, diversions, subsurface agricultural return flows,

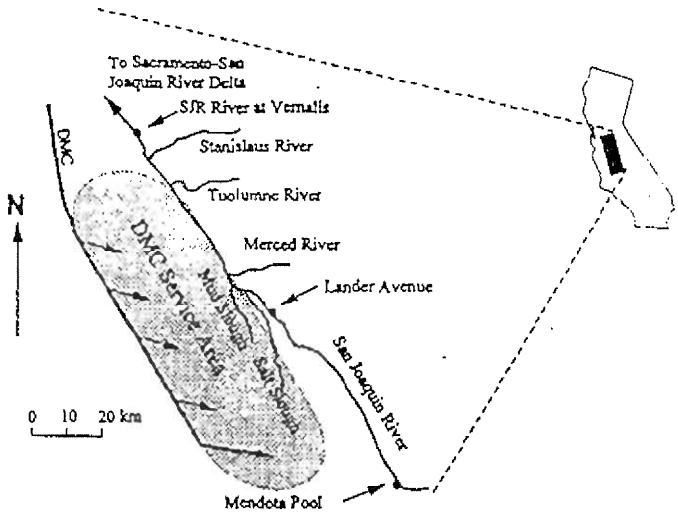


Figure 1. Lower San Joaquin River Study Area

surface agricultural return flows, municipal and industrial discharges, groundwater accretions and depletions, riparian vegetation water use, evaporation, and precipitation.

Discharge and EC data for the major tributaries and sloughs were obtained from the United States Geological Survey (Shiffer, personal communication, 1995) and California Department of Water Resources (Yamagata, personal communication, 1995). Boron and selenium data were obtained from the CRWQCB,CVR (Westcot, personal communication, 1995). Flow and water quality data for other model components were estimated based on a mix of constant parameter and historical data as described in Kratzer et al (1987).

San Joaquin River Salt Loads

SJRIO was used to estimate discharge, TDS, boron and selenium loading to the SJR. A full set of flow and water quality data needed to run SJRIO was compiled for water years 1985 through 1994. The model was run in calibration mode so that model results at Vernalis would match observed Vernalis discharge and water quality.

The mean annual salt load added to the lower SJR for water years 1985 through 1994 was approximately 845,000 metric tons per year. The net discharge of salts out of the basin via the SJR near Vernalis was 700,000 tons per year. This model calculated load is the same as computed using historical mean monthly flow and EC data for the USGS gage near Vernalis. The difference of 145,000 tons per year between the loading and discharge figures is mostly attributable to the loss of salts in the lower SJR due to agricultural diversions. The mean annual diversion from the main stem of the lower SJR is approximately 222 million cubic meters per

year. The mean annual boron load added to the lower SJR was approximately 1,000 tons and the mean annual selenium load added was 4,300 kilograms. Agricultural diversions in the lower SJR accounted for an average loss of 163 tons of boron and 795 kilograms of selenium.

The east-side tributaries account for most of the flow in the SJR but Mud and Salt sloughs contribute the greatest TDS, boron and selenium loads (Figure 2). The sloughs contribute disproportionately high selenium load relative to TDS and boron. Groundwater contributes less than five percent of the total selenium load but over twenty percent of the TDS and boron load. The east side tributaries contribute less than ten percent of the selenium load but close to twenty percent of the TDS load. Surface agricultural return flows contribute a higher percent of the TDS load than they do of boron or selenium. Preliminary SJRIO model runs show that reduction of subsurface agricultural return flows in the sloughs result in significant reduction of selenium loads but much less reduction of boron and TDS.

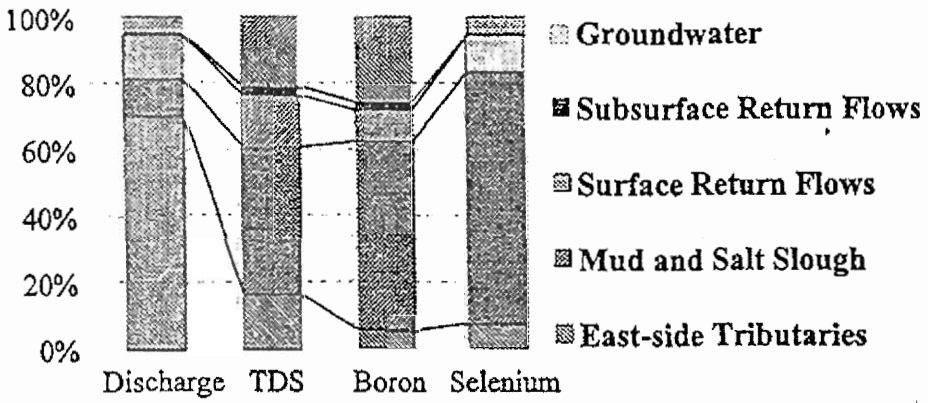


Figure 2. Mean Percent Discharge and TDS, Boron, and Selenium Loads in the San Joaquin River for Water Years 1985 Through 1994

Figure 2 does not show the breakdown of sources for Mud and Salt sloughs. Flow and load in the sloughs come from a combination of surface and subsurface agricultural return flows, seasonal wetland releases, and flood flows. Recent studies show that March and April wetland releases from Grassland Water District can account for ten percent of the TDS load and nineteen percent of the boron load in Salt Slough during these months (Grober et al, 1995). Little selenium was attributable to wetland releases.

Delta Mendota Canal Service Area Salt Budget

The major source of imported salts in the lower SJR basin and DMC service area is the DMC. An estimate for the amount of salt imported to the DMC service area was made based on monthly diversions into the DMC and mean monthly EC values. Accounting for losses to the State Water Project at O'Neill, the approximate

mean annual delivery to the DMC service area for water years 1985 through 1994 was 16 billion cubic meters and the mean annual salt load was 545,000 tons. The flow weighted average monthly TDS concentration was therefore 330 mg/l for this time period. This 545,000 ton annual salt loading is in agreement with previous estimates made by the San Joaquin Valley Drainage Program (SJVDP) in their report on San Joaquin Valley salt budgets. (SJVDP, 1988)

SJR discharge into the Sacramento-San Joaquin River Delta is the only outlet for salts in the basin. The movement of salt to deep groundwater or confined aquifers is sometimes referred to as a loss (SJVDP,1988). This should be considered a short term loss because the salts still reside in the basin and will eventually be discharged to surface waters through natural groundwater accretions or groundwater pumping. The SJVDP report estimated a salt budget for two subareas (Northern and Grasslands) that are roughly equivalent to the DMC service area. The mean annual movement of salts to the confined aquifer beneath this area was estimated to be 390,000 tons per year. This report also found that 245,000 tons of salt per year were being pumped to the surface from the confined aquifer and 227,000 tons of salt per year were being dissolved and mobilized in surface soils within these subareas.

Based on the salt load information presented for the SJR and DMC service area, it is possible to make a rough accounting of salt in the lower SJR basin. The purpose of this accounting is to present the relative magnitude of the various salt loads in the basin and not necessarily to suggest the presence or absence of a salt balance. The data presented here show that there is a mean annual salt inflow of 545,000 tons into the DMC service area from the DMC, 145,000 tons recirculated from SJR diversions, and 227,000 tons from salt dissolution for a total of 917,000 tons per year. Mean annual salt discharge for the SJR near Vernalis is 700,000 tons which includes 135,000 tons from the east side tributaries. The net basin discharge of salt from the DMC service area is 565,000 tons per year. This suggests a net gain of 352,000 tons per year in the DMC service area. If one considers the confined aquifer a sink and includes 245,000 tons per year gained from pumping and 390,000 tons per year lost to leakage, then the annual net gain for the DMC service area is 207,000 tons per year, with a net loss of 145,000 tons per year to the confined aquifer.

Preliminary model runs using SJRIO show that there would be little immediate degradation of water quality in the river when the quality of DMC supply is degraded. An increase from 330 mg/l to 430 mg/l in DMC water would result in an increased TDS load of 36,000 tons per year entering the SJR-- four percent of the total SJR load. This 100 mg/l increase in the supply water of the DMC would actually add 163,000 tons per year to the DMC service area. The difference of 127,000 tons would go into short or long term storage in confined and unconfined aquifers.

Summary

The relatively high loading of boron and TDS from groundwater, east-side tributaries and surface agricultural return flows will make management of these loads difficult. Management of subsurface agricultural return flows can have a dramatic impact on SJR selenium loads but comparatively little effect on boron and TDS loads. Wetland releases in the spring add significant amounts of boron, moderate amounts of TDS and little selenium to the lower SJR. SJR diversions remove significant amounts of salt, selenium and boron from the river but contribute to the problem of salt recycling in the basin. Similar recycling is probably occurring with the diversion of Sacramento-San Joaquin River Delta water into the DMC. Preliminary results using the SJRIO model show that a 100 mg/l increase in TDS concentration of irrigation water supplies from the DMC would result in an immediate four percent increase in salt load to the SJR. Long term increases would be higher as salts in short and long term storage move through the groundwater system.

Long term water quality improvements in the SJR will not be obtained by simply reducing short term salt loading to the river. Efforts must be made to reduce basin-wide salt loading or increase salt exports from the basin to promote long term improvement of SJR water quality and ensure continued productivity of the basin.

References

CRWQCB,CVR. (1994). "The Basin Plan for the San Joaquin River Basin", 3rd ed. Central Valley Regional Water Quality Control Board Report.

Grober, Leslie F., J. Karkoski, T. Poole. (1995). "Water Quality Impact of Wetlands on San Joaquin River, California". In Proceedings of Versatility of Wetlands in the Agricultural Landscape. ASAE. September, 1995. Tampa, FL.

Karkoski, J. (1996). "Dynamic Versus Quasi-static Effluent Limits". In North American Water and Environment Congress '96. June, 1996. Anaheim, CA.

Kratzer, C.R., P.J. Pickett, E.A. Rashmawi, C.L. Cross, and K.D. Bergeron. (1987). "An Input-Output Model of the San Joaquin River from the Lander Avenue Bridge to the Airport Way Bridge", Appendix C of California State Water Resources Control Board Order No. W.Q. 85-1 Technical Committee Report.

Leighton, D.A., S.J. Deverel, J.C. Macdonald. (1991). "Spatial Distribution of Selenium and Other Inorganic Constituents in Groundwater Underlying a Drained Agricultural Field, Western San Joaquin Valley, California". U.S.G.S. Water Resources Investigations Report 91-4119.

SJVDP. (1988). "San Joaquin Valley Hydrologic and Salt Load Budgets". Prepared under contract to the United States Bureau of Reclamation for the San Joaquin Valley Drainage Program by CH2M Hill.

SWRCB. (1995). "The Water Quality Control Plan for the San Francisco/ Sacramento-San Joaquin Delta Estuary". State Water Resources Control Board.